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THE

JOURNAL OF TUBERCULOSIS.

A QUARTERLY MAGAZINE DEVOTED TO THE PREVENTION AND TREATMENT OF TUBERCULOSIS.

KARL VON RUCK, B. S., M. D.,
EDITOR.

VOLUME II, 1900.

A. H. McQUILKIN, Publisher,
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ORIGINAL CONTRIBUTIONS.

SOME MEASURES LESSENING THE INFECTION AND SPREAD OF TUBERCULOSIS.

BY DR. S. CASE JONES, ROCHESTER, N. Y., CHAIRMAN OF THE TUBERCULOSIS COMMITTEE OF THE NEW YORK STATE BOARD OF HEALTH.

The crusade against tuberculosis is being carried forward slowly and surely in the right direction, inasmuch as sanitarians and the medical profession in general at the present time recognize it to be caused by a living organism, the tubercle bacillus. It is therefore an infectious disease, and the only true method to pursue is to destroy or stamp out the infectious bacillus and thus prevent the ravages of tuberculosis. Too much praise cannot be given to those who are educating the tuberculous patient not to expectorate at random about streets or buildings, but that the sputum must be disinfected and that pure air and cleanliness are potent factors in bringing about a recovery. I wish to call your attention to measures that would prevent the spread of tuberculosis by having a perfectly wholesome meat and milk supply, and I shall try to do this by asking your attention to a paper that I read before the Conference of State and Provincial Boards of Health of North America, at Richmond, Va., May 23-24, 1899, upon a question proposed by the Province of Quebec, as follows:

"A State or Province not being ready, for various reasons, to undertake the complete and progressive eradication of tuberculosis among cattle, as undertaken in other States, its State or Provincial Board wishes at least to have sufficient laws to enable it to protect, in a fair measure, milk and meat supply. What legislative enactments (clauses ready for presentation to legislature desired) would be fairly adequate to this end?"

The proposition presented by the Provincial Board of Health of Quebec, for discussion by this Conference, has been submitted for my consideration, with the request that I shall propound a paper to be read before you.

I feel inadequate to the task, and I shall expect that whatever I may

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present shall be only as a few seeds scattered on the parched and barren soil of legislative enactments, hoping that they may be watered and nourished by the rain and sunshine of good public sentiment until they may grow and mature into sound laws for the prevention of the spread of tuberculosis, and be another step in this age of progress toward the stamping out or modifying of another preventable disease.

If Boards of Health have any function in a commonwealth, they are charged with the duty, and should be given legal authority, of protecting the public, so far as may be possible, against the ravages of disease and death. If they fail in this, they degenerate into a mere farce and serve no useful end.

They must warn the public continually of the dangers which threaten life and health from unsanitary conditions; they must urge and exhort medical fraternities to disseminate among the laity a proper knowledge of infectious diseases; they must instruct local authorities in the best methods of abating nuisances and of stamping out infection; but, more, they must not be simply an index finger pointing the way—they must be given the power and means to force those, who disregard the fundamental principles of life and happiness, to walk therein.

First, let the State Boards warn the public of the dangers that arise from the spread of infectious diseases. These dangers the public must accept largely from the conscientious statements of those who study to prolong life, and whose knowledge is derived from special investigations and laboratory deductions.

Second, the State Boards must be given authority and reasonable money appropriations to enforce just laws which provide for the greatest security of life and saving of property.

During the past decade 130,000 lives have been lost in New York State from tuberculosis, beside the suffering and commercial loss entailed by the infection among one-half or one-third the population of the State. In the city of Syracuse an ordinance was passed last year by the Board of Health requiring all herds from which milk was sold to be tuberculin tested. Since January 1st 4,117 cattle have been tuberculin tested, and 378 out of that number were condemned and quarantined. It will be seen that the number condemned is a little less than 10 per cent. of the total number examined. Many of these cows when slaughtered showed generalized tuberculosis, involving the lymphatics and udders.

The greatest factor needed for the enactment and enforcement of laws suppressing bovine tuberculosis is to arouse public sentiment and convince communities that tuberculosis is caused by a definite specific living organism, the tubercle bacillus. That this virulent germ is bred and spread by diseased animals and human beings, and that pure milk and meat from healthy animals is an imperative necessity; that the isolation and destruction of all tubercular animals from dairy and stock herds is an economic stroke of policy, as well as a matter of public safety. The enlightened and intelligent farmer does not strive to maintain foot-rot in his sheep, glanders in his stables nor anthrax among his flocks. He knows that only when these infections are destroyed, his property is secure. Why should not the same, and even greater, vigilance be maintained by communities and individuals against the most deadly, insidious, persistent, infectious disease of man and animals at the present day? And when the individual farmer, stockman or dairyman lacks the knowledge, or is so bigoted that he will not believe what medical science is able to prove regarding the infectiousness of tuberculosis, I maintain it is the duty of legislative bodies to provide means by proper laws for investigating and suppressing the prevalence of bovine tuberculosis.

Legislatures should give State Boards of Health the necessary authority to apply the tuberculin test to animals for the purpose of diagnosing and maintaining the diseased animals in quarantine, or of causing their destruction. And local Boards of Health should have the power or exercise the right they already have of making ordinances which will require that any milk or dairy product which shall be offered for sale in any municipality shall be taken from herds that have been tuberculin tested by a competent veterinary, who has authority from the State Board of Health, and who shall certify to the health of the herd supplying the milk or dairy product. Each municipality should employ the veterinary, and the herds must be examined and a bill of health given annually before May 1st.

The test and examinations can best be made during the stabling season, and at the same time the sanitary conditions of the stables, barns and other surroundings should be reported to the local Board of Health.

The obstacles in the way of a complete or progressive eradication of bovine tuberculosis are: First, the ignorance, indifference and bigoted opposition of cattle-owners in recognizing the dangers that arise from keeping diseased and healthy animals together; second, the enormous expense if any wholesale destruction of diseased animals is undertaken, as the summary destruction of private property by the State requires the payment of indemnities for property destroyed, besides the heavy expense of sending and employing veterinaries to apply the test, also to appraise the value of herds and, if slaughtered, to make careful autopsies.

But if the State does not provide to pay indemnities for diseased and slaughtered cattle, it should be ready, through the State Board of Health, to give scientific aid to local Boards of Health, and to cattle-owners, by furnishing them instructions in regard to suppressing the infection by furnishing a reliable supply of tuberculin and sending out competent veterinaries to make the test, and warning the owners of diseased cattle of the danger of using food products from reacting animals. It may be possible to direct the owner that by separating the reacting animals from healthy stock and keeping them in a state of quarantine, they may be fattened and killed and, if a careful inspection does not find generalized tuberculosis, the carcass can be safely sold for beef. This does not seem to be good logic, from a sanitary standpoint, to insure a pure meat supply; but if every State and Province would establish public abbatoirs and require the slaughter of all beef under inspection, it would insure the public of a reasonably safe meat supply and, at the same time, allow the producer a fair chance to dispose of cattle in the open market which might react under the tuberculin test, still being in good condition, they need not be a total loss to the owner.

In this way the stock raiser will be educated and aided in ridding his herd of undesirable stock, and if any were badly diseased and unfit for food, the State has been helpful to him in diagnosing their condition and showing him the great benefit of purifying his herd. The sooner he destroys reacting animals the less loss will be entailed, by preventing the infection of others in his herd which may be healthy at the time of making the test. I believe it would be desirable for the State to have a statute that would give the State Board of Health the power to destroy any animal affected with tuberculosis whenever said Board may deem it necessary for the purpose of preventing the spread of infection, or of making an object lesson, and when in such cases animals are destroyed, the post mortem examinations showing tuberculosis, the owner should be allowed one-half the market value of live weight. If the animal does not prove to be diseased, the owner should receive full market value by weight. With such a statute or section in the law governing tuberculosis, and with a small annual appropriation, the State Board of Health would from time to time demonstrate in different localities the conditions that exist in infected herds. These public object lessons will do more in teaching and convincing the skeptical and selfishly ignorant dairyman than all printed instruction or scientific logic.

For the proper restriction of bovine tuberculosis in a State or Province we would recommend legislation under the following general divisions:

1st. Provide means by proper laws of giving State or Provincial Boards of Health the authority to investigate concerning the existence and cause of tuberculosis in cattle, and the danger to the public health therefrom, giving such Boards the power to apply the tuberculin test to any animals in the State for the purpose of diagnosis, or of quarantining all tuberculous cattle, or causing their destruction.

2d. Extending the powers of the State Board of Health to local Boards of Health, by instructing them to pass local ordinances requiring that any milk or dairy products which shall be sold or offered for sale in any municipality shall be from herds that have been examined or tuberculin tested by a competent veterinary, who has authority from the State Board of Health, who shall certify that the herd supplying the milk or dairy product is free from all disease.

3d. Make a law to prevent importing into the State any cattle for dairy or breeding purposes until they have passed the tuberculin test.

4th. Require by law the slaughter of all fat or beef cattle which are sold or used for food at a public abbatoir, and under competent State inspection, both ante and post mortem, putting a tag on each carcass or quarter of carcass, setting forth the date of inspection and slaughter, the quality of meat and the name and number of the licensed inspector. Said abbatoir inspectors to be appointed and licensed by the State Board of Health.

AN EARLY SIGN OF TUBERCULOSIS.

BY THOS. F. HARRINGTON, M. D., LOWELL, MASS.

A recent report of the League for the Prevention of Tuberculosis says: "For every six persons in this country (France) at least one dies of consumption. Of the 850,000 deaths that occur every year in France over 140,000 are caused by pulmonary tuberculosis or phthisis, and this number, instead of decreasing, goes on augmenting every year. All epidemics and contagious diseases combined—typhoid, varioloid, scarlatina, measles, diphtheria, cholera, etc.—do not cause half as many deaths." That the conditions in France are but the portrayal of those in other countries was evident from the published reports of the recent International Congress for Tuberculosis held at Berlin in May of this year.

It is now generally admitted that if the disease could be detected in what might be called the pre-tubercular stage, before the presence of the bacillus is demonstrable or before ausculation and percussion reveal the presence of the disease, a good step in advance would be taken towards the reduction of the number of cases now reported as incurable.

Inasmuch as science today possesses a knowledge of the means of diminishing the ravages of this disease, any observation tending to recognize the disease, especially in its very early stages, should be made known, even though the observation be incomplete or the deductions faulty. The glistening eye of the consumptive has often been commented upon, as well as the pupil-state in many diseases, but there is a condition of the eyes which is quite constant in patients who present themselves in the physician's office or at the clinic and who make no mention of any symptom suggestive of a tubercular trouble, and in whom there are no evidences, either to physical or microscopic examination, of tuberculosis. I refer to a widely dilated state of both pupils; not a paralyzed pupil, but rather one which seems to be in a more or less constant state of dilatation, due to some irritation along the track of the nerve fibres in the cilio-spinal region or perhaps an irritation of the sympathetic, brought about by some blood change associated with very early tubercular infection and not yet fully recognized.

I have repeatedly observed this condition of the pupils in persons who were apparently well; also in those exhibiting manifestations of a liver, stomach or intestinal disturbance, with no reason for suspecting tuberculosis; yet so frequently has tuberculosis followed at a later day that I have come to associate widely dilated pupils with incipient tuberculosis. Again and again I have made a note of the pupil condition in patients with typhoid fever, pneumonia, measles, post-operated surgical cases, etc., and so uniformly has tuberculosis developed in those showing dilated pupils that I now give a guarded opinion in prognosticating such cases. I readily admit that such a sign is not infallible, and that there are cases of tuberculosis in which it does not occur as a premonitory sign, also that some persons have widely dilated pupils without tuberculosis ever developing. Yet, I offer it as the result of individual observation in the hope of interesting those who have dealings with a large number of tubercular-exposed suspects in order that the value of a sign so easily recognized may be disproved or confirmed. If the presence of dilated pupils be the cause of instituting preventive measures against tuberculosis in any number of cases some good will necessarily result, much more, in fact, than can possibly follow the detection of the bacillus in the sputum or the employment of any means yet discovered for the mitigation of the ravages of this terrible destroyer of mankind.

THE DIAGNOSIS OF INITIAL STAGES OF PULMONARY TUBERCULOSIS.

BY WM. R. COCHRANE, M. D., KNOXVILLE, TENN.

The more recent additions to our knowledge of definite methods of checking the progress of tubercular infections, and especially that form of the disease which from its location is denominated pulmonary tuberculosis have prominently accentuated the fact that our success in applying any or all measures directed toward the relief of this condition is immeasurably increased by an early recognition of the morbid process with which we have to deal.

There is probably no one disease incident to humanity which has been the subject of such wide-spread, earnest, scientific research upon the part of the medical profession; and especially within the past sixteen years has our knowledge of the etiology and pathology of the disease supplemented the interpretation of many of its physical signs and manifestations, to such an extent, as to assist us to a definite understanding of its multiple processes, and to give us a clear grasp of the lines of procedure by which we may hope to mitigate its ravages.

Within the past six years, and based upon our extended knowledge of the condition with which we have to deal, advance after advance has been made in the elaboration of measures designed to assist in securing permanent recovery, and today we stand well upon the threshold, if not already within the sanctuary, and it seems the general concensus of opinion that within the next decade, with the elaboration of already conceived methods, and the accumulated evidence of statistics now in process of being obtained, we shall have at our disposal procedures which will enable us to add tuberculosis to the list of medical battles fought and won. Yet, with the armamentarium which we shall have at our disposal, and with all our added knowledge of methods of treatment, there will be no "specific" which will check the ravages of the later stages of the disease, and, above all, we must recognize that it will be only by bringing to bear all of our forces upon the incipient disease prior to the establishment of a "mixed infection," with its progressive stages of necrosis, suppuration, irreparable destruction of vital tissue and profound systemic impression, that we may hope with any definite assurance for a successful termination.

It is to the methods of recognition of these earlier stages of the disease that the scope of this paper is limited.

Essentially an infectious disease, primarily due to the entrance into the system of a specific and definitely isolated bacillus, and the colonization of these micro-organisms in the tissues of an individual, which, from inherited or acquired susceptibility, afford a suitable culture medium for their rapid development, it is of marked moment from a clinical standpoint that we recognize the pathology of its earlier stages, not only as a means to its early detection, but also from a point of view which more properly would come within the field of preventive measures, and would especially cover measures designed to prevent its development as a metastatic or secondary process from infective foci established elsewhere than in the lungs themselves.

The established classification of pulmonary tuberculosis is into the three general classes of Bronchogenic T., Hematogenic T. and Lymphogenic T., the terms themselves being self-explanatory and significant of the routes by which the bacilli gain access to the pulmonary tissues.

In the first of these, Bronchogenic Tuberculosis, the source of the infection may be directly from the outside, by means of infected currents of air carried directly into the bronchi; or, from infection by the same mechanical process from already established tubercular lesions of the nose, mouth, larynx, pharynx or bronchi. Corresponding to the virulence of the infecting organisms, the location of colonization, or the inherent resisting power or susceptibility of the individual, we may have from this form of infection:

(a) An acute caseous phthisis (galloping c.), most frequent in children and in young adults, and in which the initial seat of the lesion may be found with almost equal frequency in either the apices or the bases of one or both lungs.

(b) A chronic ulcerative phthisis (chr. pneumonic p.), most commonly developed in adult life, and with the initial lesion at the apex of the lung in the great majority of cases; when occurring in children, however, the initial lesion may be found with almost equal frequency at either apex or base.

(c) A fibroid phthisis, most frequent in adults, and in which the fibroid processes are especially active, causing marked fibrous encapsultation of infected areas, which, when complete and accompanied by calcareous changes, often inhibit the further development of the disease, and a "so-called spontaneous cure" is the result.

In Hematogenic Tuberculosis the lesion is usually secondary to a tuberculous lesion elsewhere which has perforated a vein and discharged its contents into the blood, or, where a tuberculous gland or other focus breaks into a lymphatic vessel, commonly the thoracic ducts, in cases of tuberculosis of the abdominal or posterior thoracic lymphatic glands. As a rule, hematogenic tuberculosis of the lungs is only a part of a general tuberculosis of the entire body. It is characterized pathologically by the formation of miliary tubercles.

Clinically, we recognize two forms, an acute miliary tuberculosis, running a rapid course and causing early dissolution, and especially characterized by a high temperature range and pronounced evidences of a general toxaemia. The chronic form runs a slower course, and pathologically is characterized by considerably more caseation of the tubercles.

In Lymphogenic Tuberculosis the lungs are implicated directly through the lymphatic vessels, or the process may be secondary to tuberculous pleurisy, or to caseous tuberculosis of the peribronchial lymphatic glands, or to tubercular disease of the thoracic vertebrae. Pathologically, the characteristic lesions consist of nodular tubercles scattered along the lymphatic vessels running into the septa or surrounding the blood vessels and bronchi.

Appreciating the varied methods of infection, and the equally varied pathologies of these types of the one disease, we are confronted, not especially by the necessity of an accurate differential diagnosis between them, which were almost an impossibility in the early stages with which we propose to deal, but by reason of the intractable nature of the infection and the acknowledged necessity for its early recognition and treatment, we are to determine the presence or absence of the parent disease, regardless of the type.

Clinically speaking, there is no so-called "pre-tubercular" stag tuberculosis, for the disease is essentially the result of tubercle formation, and the clinical symptoms are absolutely negative until the morbid processes have so far advanced as to produce some disturbance of the natural equilibrium of the individual from that normal condition which we designate as health. As medical men, it is but rarely that we have an opportunity to observe the initial stages of the disease, not at least until the invasion has advanced sufficiently to claim the attention of the patient, or of his relatives or friends. At this time a careful examination will usually determine the nature of the lesion.

It is a well accepted fact that there is no disease in the earlier stages of which we are more dependent for an accurate diagnosis upon a careful weighing of numerous physical signs and symptoms, and in which the personal and family history of the individual bear such close and definite relations. Even in cases in which the personal history of the individual seems fairly free from a suspicion of susceptibility or of a tendency toward lowered vitality, a recent observer has pointed out that a family history not alone of phthisis, but also of a general lack of resistance to disease, should be taken into consideration as increasing the probability of tuberculosis.

Prior to the detection of bacilli in the sputum the earlier physical signs will probably consist with varying regularity of occurrence of:

A respiratory murmur of lowered intensity but with a somewhat sharper pitch in the commencing stage of infiltration; as the infiltration progresses the respiratory murmur becomes gradually harsher, more or less cog-wheel in type, and often we may detect slight pleuritic friction sounds, or even fine sub-crepitant rales over limited areas. Careful percussion may elicit a slight dullness, and, with the increasing thickening of tissues by infiltration, there is often an excessive transmission of heart sounds, and local areas of increased vocal fremitus. That these signs vary in their relative prominence with the individual case, it is needless to call attention; each one is indicative of abnormality, however slight, and it is only by eliciting some deviation from the rythmical softness of normal respiration, and resilient percussion note of health, together with the variations in transmission of heart or voice sounds, that we are able to appreciate the local beginnings of the proliferative and degenerative processes which characterize the disease.

In close connection, from a diagnostic standpoint, occur many symptoms upon which we rely for corroboration of the suspicions aroused by the presence of the physical signs just alluded to. These symptoms occur with a fair degree of regularity in all cases of tubercular infection of the lungs, and, by antedating the physical signs, they increase in prominence with the development of the local manifestations, being in the great majority of cases the determining cause of the application of the patient to the medical advisor.

Chief among these corroborative disturbances is probably slowly progressive anorexia, irregular in type, accompanied by a persistently coated tongue, and, dependent upon lessened food ingestion, as well as upon metabolic and assimilative disturbances, we note a progressive loss of bodily weight. Accompanying this are early and slight fluctuations in temperature and pulse rate; a slight increase in both, ranging from 1-5° to 1° in temperature and from 10 to 30 pulse beats, are usually to be noted after mid-day, the pulse being weaker or softer than normal. The morning pulse and temperature are usually unchanged in the early stages of the disease, although we occasionally note a slightly subnormal temperature index. In this connection it is well to note the effect of excessive mental or physical exercise upon the tuberculous, either of which causes an increase in pulse rate and temperature in excess of that produced in the healthy individual.

One of the earliest symptoms is what is usually referred to as "anaemia," as indicated by the peculiar pallor of early tuberculosis; this, more properly "pseudo-anaemia," is apparently due to some vaso-disturbance of the peripheral vessels, for repeated counts in tubercular cases evidence conclusively that this appearance in the early stages is not due to a diminution in red blood corpuscles, leucocytes, or hemoglobin; these elements remaining close to a normal percentage until influenced by the profound disturbances of the later stages, in which we observe a true anaemia, with lowered count of corpuscular elements and a lowered hemoglobin percentage.

Accompanying these symptoms, careful questioning will usually elicit the occurrence of sweating, perhaps at night, of varying appearance and amount. I am inclined to believe that these "night sweats" are of a much earlier appearance than we possibly appreciate, and that in the great majority of cases, while persistent, yet are so slight as to be unnoticed, or their significance overlooked by the patient.

Haemoptysis, when not directly referable to other causes, is a symptom of fairly frequent occurrence, and occasionally presents itself as the first appreciable indication of the destructive processes which have been insidiously developing.

In addition among the early symptoms, the gradual development of a slight hacking cough, unexplained by any evidence of an elongated uvulva or by tonsillar or faucial irritation.

Among other symptoms occurring with infrequent regularity may be noted pleuritic pains occurring beneath the scapulae, or about the upper part of the chest. Repeated chilly sensations. Flushing of heat.

Fleeting neuralgic or rheumatic pains in various portions of the body. The "glistening" appearance of the eyes, and the "hectic" flush often apparent in the cheeks. A peculiar mobility of the alae of the nose may often be noticed during respiratory efforts.

These, with variations in the order of their appearance and prominence in different individuals, impress the observer as the more frequently occurring physical signs and symptoms of the initial stages of the disease.

With the advent of more recently developed methods of investigation, the use of tuberculin as a diagnostic measure has been advocated by men of unquestioned integrity, and its use in the hands of trained observers is of great value in appreciating not only the presence of tuberculosis, but also the extent of the involvement. Barring considerable discomfort to the patient from occasional excessive reactions, both general and local, its use is absolutely devoid of danger, and of considerable value in the diagnosis of the earlier stages. Unfortunately the care and precautions necessary in order to obtain reliable data will probably limit its use to the hands of those who have the time and opportunity to familiarize themselves with the precautions necessary in its diagnostic administration. A most valuable property of the test consists in its peculiar sensitiveness of reaction during the very incipient stages of tuberculosis. In more advanced conditions it loses its sensitiveness, and its use then, considering the facility of diagnosis by other measures, is practically contra-indicated.

With the development of cough and the appearance of sputum, the question of diagnosis becomes much simplified by the opportunity thus afforded of examining for the presence of tubercle bacilli, a procedure which should be instituted in every suspicious case, even where the physical signs might negative the probability of tubercle. While the inability to demonstrate the presence of the bacilli in the sputum does not necessarily negative the existence of tuberculosis, on the other hand their presence demonstrates conclusively and to the exclusion of all doubt the existence of tuberculosis.

The use of the X-ray as a means of detecting areas of consolidation presents itself for consideration, and a recent report by Dr. Francis H. Williams (Boston Medical and Surgical Journal, June, 1899) demonstrates that by means of the fluorescent screen the trained observer may detect structural abnormalities in lung tissue prior to the development of physical signs. Its use, however, in view of the comparative simplicity of other equally accurate methods, and the difficulty of its universal adaptability, must necessarily be limited, and I should place it among valuable but merely corroborative diagostic measures.

I have endeavored to give in brief a synopsis of the more prominent and relatively pathognomic symptoms, as well as the physical signs and clinical methods by a careful study of which we may with reasonable certitude be enabled to detect the initial stages of pulmonary tuberculosis. In presenting these I have discarded many corroborative symptoms which occur with such relative infrequency as not to admit of their consideration with those just described.

It is only by a careful and painstaking weighing of the relative importance of presenting conditions, together with a careful estimate of the part which age, occupation, surroundings, personal and family history, and probability of exposure to infection, may bear, that we are enabled in many cases to arrive at a definite conclusion. It is a point of great importance to bear in mind that in a large percentage of pulmonary cases the primary focus of infection may be discovered in a well developed form elsewhere in the body, the pulmonary involvement proving merely a secondary condition.

In conclusion. I would call your attention to the advantages, in a physical examination, of:

Removing all clothing to the waist for any accuracy in auscultation or percussion.

The use of the percussion hammer with a finger as a pleximeter in detecting areas of slight thickening.

The advantage of "open mouth" breathing during auscultation or percussion.

The advantage of forced inspiration and expiration during the examination of suspicious areas.

The absolute necessity, for the evidence afforded, of examination of the sputum of all suspected cases.

The employment of the "tuberculin test" in suspicious cases of very recent development, in which only indefinite conclusions can be reached by other methods of diagnosis.

TREATMENT OF PULMONARY TUBERCULOSIS WITH SPECIAL REFERENCE TO SPECIFIC MEDICATION.

BY J. NORMENT BAKER, B A., M. D., CLEARWATER, FLA.

In presenting this article no endeavor is made to give to the profession any new or startling facts in regard to a disease to which man has been heir from time immemorial. So many such have already been adduced that the effect upon most of us has been to blast our hopes in all, and when confronted with the disease we are inclined to view our patients as already doomed and beyond human aid.

The treatment of tuberculosis does not stand on a sufficiently stable pedestal for any of us to take a defiant stand in behalf of any one method. Even in the light of our present knowledge, there still remains much of its pathology and symptomatology, of its diagnosis and treatment, hidden from us.

Physicians really interested in this subject should, by carefully recording and publishing the results of their experiences, endeavor to impress upon their less interested fellow-practitioners the paramount importance of the subject, and especially of that pertaining to an early recognition of the disease.

This element, "early recognition," is to be especially emphasized, for by this means are our chances for a complete recovery greatly enhanced, and by it also are many subsequent blunders eliminated.

How, then, are we to recognize the disease in its early stages?

The symptomatology is truly a complex and varied one; yet, when carefully watched and studied, we can usually find one or more symptoms prominently marked and which will lead us aright. It should be borne in mind that tuberculosis is, pre-eminently, a disease of recurrences. The fact that a patient recovers from the first, or even second attack, does not disprove that the process is tubercular.

First of all, the microscope should be used with care and diligence. The demonstration of tubercle bacilli is, of course, the criterion by which a positive diagnosis is to be made. Yet, as we all know, in the earlier stages, when the expectoration is scant, repeated examinations often fail to reveal the specific bacilli; the reason being that the process has not advanced to that stage of necrosis where the bacilli are thrown off to any appreciable extent.

Here, then, the value of the microscope amounts to this: if the examination be positive, then the diagnosis is certain, but a negative result does not warrant a negative diagnosis being made. Of the various factors to be considered in reaching a diagnosis, the following are important:

The family history should be carefully inquired into. While aware of the recent warfare that is being waged in the attempt to eliminate heredity as a predisposing causative factor, yet my experience goes to show that a goodly number, almost half, give tubercular histories.

Age—Although occurring at all ages, the ravages of the disease are more fearfully wrought on the young adult. This fact it is well to bear in mind in making a prognosis. With infection occurring later in life, the process advances more slowly.

Environment—A sedentary, confining and unsystematic life, by lowering the general tone of the body, produces conditions favorable to inroads and advance.

Previous disease—Of these, pneumonia is especially important. Not infrequently does it happen that tuberculosis is immediately stamped upon a pneumonic lung (a point in favor of isolation of tubercular patients in wards and hospitals); or, even if this condition does not obtain, this disease leaves the lungs in a more or less permanently weakened condition.

The general symptoms should be carefully watched. Slight evening fevers, quickened and feeble pulse, impairment of appetite and digestion, slight loss of weight, a scarcely perceptible cough with possibly little or no expectoration, are all points which, though individually insignificant, mean much to the experienced and watchful physician. Of these, temperature is the most suggestive and of most importance. An evening temperature, possibly slight, normal or subnormal in morning, and where malaria can be eliminated, is almost certainly of tubercular origin. Not only is it valuable from a diagnostic point, but it is also valuable as an index to the activity of the process.

Pain is an inconstant and variable symptom; unless there be some involvement of the pleural surfaces it may be absent altogether. There is often no pain; but a patient will complain that there is, at times, a slight feeling of oppression or constriction at one or more points in the chest. It is noteworthy that with apical involvement pain is seldom elicited at this point.

Such, in brief, are the most important subjective signs. Next should come a careful physical examination of the chest. Without going into detail as to what constitutes a thorough exploration of the chest, suffice it to say that every physician should endeavor to educate himself sufficiently in this branch, so as to be able to detect and appreciate the full meaning of the less pronounced, yet no less characteristic, physical phenomena that present themselves in the earlier stages of phthisical processes.

A "music box" chest, decided emaciation, marked dullness, bronchial breathing, amphoricity, these are not concomitants of early phthisis, but belong rather to the later stages.

A localized enfeebled murmur, a fine moist rale or "mucous click," a very slight increase in dullness, pectorophony or fremitus, these are to be our landmarks and guides at this stage, and to the experienced examiner they convey a world of meaning.

Should the first examination fail to reveal anything characteristic, repeated examinations should be made until the physician is satisfied that he is not dealing with tuberculosis.

To this end, when the clinical picture and physical phenomena are not conclusive, we are often helped by the use of one of the tuberculin preparations—Koch's Tuberculin or the Watery Extract of Tubercle Bacilli (von Ruck). My experience has been entirely with the latter agent, yet in both the mode of action and the effects produced are similar. No evil effects have followed its use, and, when properly applied, I do not believe there can be any. The dosage as recommended for the Watery Extract (1-10 to 5-10 c.c. No. 10, equal to 1-10 to 1-2 milligram) is for the earlier stages amply sufficient, and it is to these dubious cases only that it should be applied. Yet in some cases, where, apparently, the process, though active, is marked by deep-seated involvement, and, consequently, with imperfect physical signs (i. e., the cases in reality are not "beginning"), a slight increase (1-10 to 2-10 c. c.) will be found necessary to produce the desired reaction. This it is well to note, as some physicians, after applying the maximum dose as ordinarily recommended, will wrongly conclude that the process they have to deal with is not tubercular, and when subsequent developments reveal their error, will be inclined to discredit the diagnostic agent used. These agents, in the hands of competent physicians, have proven, almost without exception, good and of valuable aid, and, with an increasing knowledge of them, will they find a more extensive use.

Having, then, after applying all the means possible to an individual case, reached a positive diagnosis, what shall be the steps toward establishing a cure?

The first step, and an important one, is to impress upon the patient the true nature of his disease, without, of course, unduly alarming him. If it be in the early stages, we can place before him good prospects of recovery, provided he, at the same time, lends his hearty co-operation.

If the patient be one of sufficient means, he should be sent to a sanitarium where tubercular troubles alone are treated. Here he can not only be given special treatment and taught the importance of living properly, but the danger of contaminating others is also avoided, a point of no small consideration.

If this cannot be done and it is decided to institute treatment, we should impress upon the patient the fact that if he would enjoy life he must fight for it, manfully and always. His environments, mode of life and diet should be carefully inquired into and regulated. Regular hours for recreation, eating and sleeping, with an abundance of sunshine and fresh air, should be insisted upon. The diet, in this class of cases, is of the utmost importance, and should be prescribed with as much care as drugs. Baths, light chest exercises and walking should be adjusted in each case, care being had that exhaustion does not ensue from their use.

After adjusting these points with the care that their importance demands, we naturally turn toward some line of medication.

The materia medica does not offer us any one drug, or class of drugs, having a "specific" action on this disease; yet from this source can be drawn drugs which will aid us much in general and symptomatic treatment, such, for instance, as will increase appetite, aid digestion, control cough and increase the blood in strength and richness. Of especial benefit are those exerting a general tonic effect and which by their action aid nature in returning to a normal state, such as the various forms of iron, arsenic, Peptomangan, etc.

Creosote and its derivatives have, in my hands, proved disappointing. We should not hope for too much from the prolonged use of this agent in large doses. In fact, with few exceptions, its use in this manner produces decidedly injurious effects upon the whole digestive tract. We do not get from any drug by its internal administration a positive germicidal effect at some remote point in the system. An agent of sufficient strength to do this must likewise prove destructive to the tissues and organs with which it comes in contact; and so it is with creosote. In small doses, however (1 to 4 minims), this agent can be administered with distinct benefit in some cases, producing upon the stomach no untoward effects and exerting during its elimination through the bronchial mucous membrane a stimulating influence, as it does upon other mucous surfaces.

Ichthyol is a remedy which is winning for itself increased confidence in the treatment of tuberculosis. It proves helpful not only to the diseased lung, but also to the stomach, aiding digestion and preventing undue fermentation. It may be administered either in solution or in capsules. The former is probably the preferable method, giving, of a 50 per cent. aqueous solution, as an initial dose, two or three minims freely diluted, and gradually increasing to eight or ten minims.

Strychnine in small doses, or, when the case is an advanced one, in larger doses, is a most valuable drug. By reason of its bitter properties it sharpens the appetite and promotes digestion. Absorbed into the general circulation it acts as a tonic to the general nervous system and has an excellent influence upon the heart. This organ in tubercular subjects is said to be of smaller size and feebler in force than in a normal subject.

Brehmer, Germany's famous phthisio-therapist, maintained that this discrepancy in size between the heart and lungs, the former being smaller in proportion than the latter, was an essential factor in the causation of tuberculosis. Whether this be true or not, we are all familiar with the relative feebleness of the heart's action in tubercular subjects, and this condition is materially benefited by strychnine.

Cod-liver oil in agreeable form is a valuable adjunct in weak and emaciated cases where all the tissue-building possible is needed. Wampole's preparation is, I think, one of the best, combining as it does nutritious, tonic and expectorant properties.

Inhalations of oxygen often prove serviceable. Cases in which dyspnoea, cardiac palpitation and a sense of constriction through the chest are marked often experience decided benefit and comfort from the daily use of this agent. A few deep inhalations, or a slow, steady stream breathed naturally, will often obviate paroxysms of coughing and induce quiet sleep.

As to inhalations of different gases and vapors there still exists much dispute. The virtue of most of these products in the market today is limited. Of these agents formalin gas has proven itself of more lasting worth than any other. Its use seems especially indicated where there is a marked catarrhal condition of the upper air passages. The benefits produced by this gas are due rather to the stimulating effect upon the mucous membranes than to any actual bacterial destruction.

Such, in brief resume, are the chief therapeutic agents to be used in the general treatment of this disease; nor should all of these be applied to every case. Before beginning treatment each case should be carefully studied and surveyed as a whole, and then to this case we should apply the treatment which seems best adapted.

There are, of course, other special symptoms during the course of the disease which will from time to time demand attention, such as cough, pyrexia, hydrosis, gastric derangements, etc. These fall to the realm of general practice, and so need not here be dwelt upon.

There remain, for the physician especially interested in this work, two agents which should constitute the major portion of his special treatment; these are the Pneumatic Cabinet and the Tuberculin and Serum Preparations.

The Pneumatic Cabinet, by its action, produces changes in the lungs, heart and general circulation which are purely physical, and in properly selected cases cannot but produce the results that we should expect from it. To relieve pulmonary congestion, control haemoptysis, loosen up retained secretions and to develop the respiratory forces to the utmost, we certainly have in the cabinet an agent which, to say the least, is most valuable.

As to the various tuberculin preparations, serums and Watery Extract, constituting what is commonly known as "specific medication," can we say that in them we possess a specific in the sense that quinine is a specific in malaria or mercury in syphilis? No; nor do the advocates of these preparations claim such an action.

The principle upon which their action is based is one of immunity. In the various diseases now known to us to be of bacterial origin, how does nature produce her cures and establish immunity? Is it not from the production by the cells of the body of a peculiar something, a proteid perhaps, when stimulated to activity by the toxins of the specific germ? In most of these diseases, when recovery takes place, is there not established an immunity more or less permanent? This, then, is nature's method of establishing a cure, and we cannot do better than to endeavor to imitate her.

For the serum is claimed that by its introduction into the body we supply to the diseased cells and tissues therein a substance which neutralizes the toxins resulting from bacterial action and thus spares them of this labor.

For the Watery Extract and Tuberculin it is claimed that these agents, when introduced into the body, stimulate the cells therein to a greater activity in the production of that change which we call immunity. These cells, owing to inadequate, slow and gradual absorption, under ordinary conditions not receiving sufficient stimulus for its production.

Thus we see that the process in the one case is a passive, in the other an active, immunization.

As to the relative merits of these agents, science is not as yet agreed; yet I believe they both are good and possess real merit. During the past five months I have used, with twenty-four cases of tuberculosis, two of these preparations—the Watery Extract of Tubercle

Bacilli prepared by Dr. von Ruck of Asheville, N. C., and Antiphthisic Serum T.R., after the formula of Dr. Fisch, prepared by Jno. T. Milliken & Co. of St. Louis, Mo. Before commencing the treatment I have endeavored, by a careful study of each individual case, to choose the preparation which seemed, on the whole, best suited to that case. Among these cases all the various stages, as commonly recognized, are to be seen. Unfortunately, a good many are in the more advanced stages, which fact, of course, necessitates a slower advancement, a more prolonged treatment and lessens the chances of a complete recovery. Yet the results on the whole are very gratifying. In those cases where the process is not advanced to the stage of complete solidification, or cavity formation, the improvement has been more marked, and a complete recovery, in the majority of cases, is to be hoped for.

As soon as the treatment of these cases has been completed, I hope to be able to report them in statistical form.

TREATMENT OF PULMONARY TUBERCULOSIS.*

BY WM. R. COCHRANE, M. D., KNOXVILLE, TENN.

A selection of methods to be employed in the successful treatment of early tubercular affections of the lungs has been, as with countless others of the profession, a matter of much investigation and study, and my appreciation of the honor of presenting, not only my own views upon the subject, but a resume of the views and accepted methods in vogue by the trained therapeutists of the present day, is only exceeded by my fear of the inability to present concisely and with proper emphasis the various methods and the scientific reasoning which has led to their adoption.

The subject is vast, its importance so great and the mass of suggested remedies so large, each with its claim to consideration, that at the first glance the task seemed impossible to condense within the limits of a society paper. As an aid to brevity, I have confined my application to cover the treatment of the early stages of the disease, disregarding measures merely of relief which may be applicable to the advanced stages, in which the profound systemic involvement and destruction of vital tissue precludes the efficacy of remedial measures.

For the sake of still further simplifying the matter, I wish to emphasize the theory which I would advance solely for the purpose, that the "the rational treatment of the disease depends upon an antagonism to the disease developed upon the part of the infected individual, and that the accomplishment of a cure of the disease, which is to consist in an absolute and permanent checking of the progress of the tubercular involvement and the complete cessation of all physical signs and symptoms pointing to deviation from the normal standard of health, is to be a direct result of a battle fought and won by the vital forces of the individual, as expressed by cell-life, on the one hand, against the invading forces of the bacterial infection on the other, and that the therapeutic agents at our disposal directly applicable to assist in this struggle for supremacy, are those upon which we should depend in our treatment of the disease."

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One of the remarkable things apparent to the physiologist and pathologist is the resistance which certain animals offer to the invasion of their tissues by the germs of disease.

Typhoid fever, cholera, scarlet fever and measles are diseases peculiar to man, and from which domestic animals are absolutely free. Man, the cow and the guinea-pig are peculiarly susceptible to tuberculosis, which the cat, dog and the horse resist.

Still more complicated becomes this to the scientific observer when we note that the frog will resist anthrax, which readily kills a white mouse, and if we attempt to explain this by an admitted difference in body temperature and in body chemistry, it will not explain why a house mouse, whose body temperature and chemistry are practically identical, can successfully combat the disease. Nor is this all; a mouse that has recovered from tetanus will not take tetanus again, and, still more remarkable, a few drops of blood taken from the recovered mouse and injected into another will protect the injected mouse from tetanus. Observations still more extended along these lines of investigation have resulted in the acceptance of these inherent or developed peculiarities as distinct potential vital phenomena. That condition in which the animal body resists the entrance of disease-producing germs, or, having been compelled to allow them to enter, resists their growth and pathogenesis, we term immunity. The opposite condition, in which there is a lack of resistance and a passive inertia on the part of the organism which allows the disease-producing organisms to develop without opposition, we term susceptibility.

To pass rapidly over the marked phenomena of these directly opposite conditions, a thorough appreciation of which is so necessary to the careful student of disease: We find two types of immunity, a natural and an acquired. By "natural immunity" we understand that natural and constant resistance which certain healthy animals exhibit toward certain diseases. By "acquired immunity" that effective resistance in animals otherwise susceptible, which is the result of accidental circumstances, and which may result:

(a) By recovery from a mild attack of the disease (yellow fever, scarlet fever, rubeola, etc).

(b) By recovery from an attack of a slightly different disease (vaccine disease).

(c) By the injection of antitoxic substances (diphtheria antitoxin).

That much profound investigation has ensued as the result of these and allied but more intricate observations, it were needless to remark, and many are the explanations offered. Unfortunately, no one theory with its sustaining observations will suffice in itself to explain the peculiar position in regard to disease offered by the animal organisms of varying species and under varying conditions. Metschnikoff, with the theory of phagocytosis in 1884; Buchner and Nuttall, with the humoral theory; Ehrlich, Behring, Wernicke and Kitasato, with the theory of antitoxins, have given us the most tenable and universally accepted theories in explanation, and in deciding upon the cause of a natural or acquired immunity or resistence it is highly probable that each of these conditions plays a part of importance and that the combined efforts of an active phagocytosis, an inherent bactericidal action of the blood-plasma and the presence of an entirely new substance in the blood, toxic in nature and proteid chemically, and which we designate an antitoxin, may all have just claims to individual and combined results in the production of immunity.

Turning to the disease under consideration, its bacteriology and pathology, the result of accurate investigation, are comparatively simple. Essentially an infectious disease, primarily due to the entrance into the tissues of a specific and definitely isolated bacillus, and the colonization of these micro-organisms in the tissues of an individual which from inherited or acquired susceptibility afford a suitable culture medium for their development, we may follow experimentally the successive steps of the invasive process from its earliest lesion to the profound tissue changes which culminate eventually in dissolution. Depending upon the virulence of the infecting organisms, the location of colonization from a histological standpoint, and the inherent resisting power or immunity of the individual, or its reverse, susceptibility, we may have the disease establishing and pursuing one of the clinical forms which are so familiar to us all, the essential pathology of which consists in the progressive destructive metamorphosis of normal tissue by the process of tubercle formation, and the resulting sequelae of general disturbances of function which are so profound in their results, and which depend primarily upon the local lesions.

Let us follow for a moment the process of tubercle development. When the tubercle bacillus is received into a tissue or organ its first effect is to stimulate or irritate the fixed connective tissue elements and to cause a proliferation of round cells which from their abundance of protoplasm resemble epithelial cells and are designated epithelioid cells. These are produced in greater or less abundance as the first reactive change of the tissues in response to the irritation of the tubercle bacilli. Next there follows an infiltration with leucocytes from the surrounding blood vessels and the focus of irritation becomes still more crowded and surrounded by these leucocytes, which represent the reaction of the vascular system to the tubercular irritation. At this stage the tubercle appears to the naked eye as a grayish, slightly translucent, pearly mass. It is non-vascular, there being no attempt at any formation of new blood vessels. Degenerative changes now begin, and coagulation necrosis and fatty degeneration soon bring about a transformation of the group of cells into a cheesy, caseous, necrotic mass. These changes result from the specific action of the tubercle bacilli, which, in the early stages, may be seen lying in the tissue and between the epithelioid cells and later largely within the cells themselves, and also from the avascular condition of the tubercle mass. As caseation and necrosis progress the bacilli become less conspicuous, and eventually none may be visible, the surrounding conditions being inimical to existence, and they pass into the more resisting stage of spore formation or die.

After the establishment of the local lesion of tuberculosis, two opposing tendencies struggle for supremacy, that of the tuberculous disease to spread and that of the normal tissues to encapsulate or limit the extension of the invading disease. It is a battle royal between the invaders on the one hand and the forces of the invaded organism upon the other. In most cases, unfortunately, the former succeed and secondary tubercles appear in adjacent parts, the transportation of the bacilli from the primary to the secondary focus being accomplished by the flow of lymph or body juices or by the phagocytic action of leucocytes which, taking from the edges of the tubercle some of the bacilli transport them by their amoeboid activity or by the lmyph streams to the neighboring parts, where they themselves fall victims to the organisms they have appropriated, and thus deposit the germs of new foci of the disease.

As a rule, tubercles steadily increase in size by the invasion of fresh tissue, yet, notwithstanding the steady advance which takes place in most cases of tuberculosis and the thoroughly comprehensible microscopical explanation of it, many cases of tuberculosis make quite perfect recoveries. The periphery of every tubercle is a zone of reaction with a marked tendency to granulation and organization, and if the vital condition of the individual is such that, through a lack of proper nutriment, an unusually active phagocytosis, or some surmised but directly inexplicable antagonism of tissue juices or protoplasmic chemistry, the activity of the bacilli is checked or their death accomplished, this tendency to cicatrization is allowed to progress unmolested and the necrosed mass is soon surrounded by a zone of newly-formed fibrous tissue by which it is completely encapsulated, calcareous infiltration of the encapsulated mass ensues, and the progress of the disease thus arrested, practical recovery takes place.

Unchecked, however, the progressive stages of invasion of new tissue are persistent, the confluence of caseous tubercles and their breaking down forming the inevitable cavity of some types of the disease, and this progressive tissue destruction, plus the secondary infection with pyogenic organisms, the interference with vital functions elsewhere, the establishment of sepsis, are but parts of a picture familiar to us all.

In considering measures for the relief of pulmonary tuberculosis, it may be readily understood that our present intimate knowledge of the pathology of the condition must assist us very materially in selecting methods of attack, or, rather, of reinforcement, to the tissues in their battle with the invading disease.

The selection of procedures which have withstood the critical tests of time and of repeated application, from their very nature and our interpretation of their therapeutic action, but strengthen the conviction that our successes in the past and our hoped-for gains in the future depend solely upon our success in developing the resisting power of the infected individual.

A successful therapy must aim first toward preventing a further extension of the local manifestations of the disease. From the very nature of the lesions, this must necessarily be obtained by increasing the resisting power of the unaffected tissues. This accomplished, the fate of the existing tubercles, and of the tubercle bacilli, is of easy conjecture. They may make their escape by the lymph channels or blood to other parts of the body and establish new foci of infection; they may succumb to the action of phagocytes; they may become encysted within the fibrous encapsulation of the tubercle, thus becoming latent; or they may escape from the body in the sputum or other excreta. We must bear in mind that, unlike the Klebs-Loeffler bacillus of diphtheria, the toxicity of the tubercle bacillus is not its greatest source of danger, but that the prime result of its presence in the tissues is the irritation of tissue cells, causing rapid cell proliferation and the formation of the tubercle, and these tubercles, in themselves degenerative, interfere with blood supply and nutrition of adjacent or remote parts by their mere mechanical presence. Our method of treatment must, therefore, consist in the employment of measures designed to assist in the limiting of the infecting process to the foci already established, accomplishing this by the stimulation of those vital processes which are concerned in the elaboration of cell chemistry, by the intensification of existing or the supplying of deficient antibacterial or antitoxic elements, and by preventing, as far as possible, the danger of the mechanical auto-infection of fresh areas. In addition to these prime necesssities for a successful result, the control of symptoms demanding attention, all of which are intimately a result of the local infective process.

Probably the most exaggerated claims in favor of any one line of treatment have been made for the benefits to be derived from climatic influences and climatic influences alone. At the risk of treading upon sacred ground and of destroying some pet illusions, I wish to add my protest against the indiscriminate shipping of our tubercular cases to "climates," and especially to climates with surroundings deleterious to the patient, to locations beyond the reach of trained medical advisors, and where the patient, unsuitably clad, physically unable to contend with the altered conditions of existence, is left, like a waif in the tide, to sink or swim by his own reserve of recuperative power, and how often he sinks can only be appreciated by the mortuary records of our climatic resorts. Understand that I am not decrying the advantages of climatic influences—no one is a more profound believer in their efficacy in selected cases than myself—but the indiscriminate advising of indiscriminate cases to go to that indefinite region known as "climate," ordered to "rough it," to "take plenty of exercise," to "eat heartily," and to ship them off with a temperature of 103 and a pulse of 120 to unknown regions, provided with a bottle of some favorite tonic and a parting injunction of "not to forget to take their cod-liver oil," is a refinement of cruelty.

A careful study of the micro-organisms with which we have to deal, and an accurate knowledge of their life processes, helps us materially in our decision as to the location which is to be selected. As a rule, a moderately high altitude, a maximum of sunlight, a minimum of humidity, freedom from electrical and wind disturbances and the selection of a region free from bacterial infection, together with the assurance of suitable food and the accessibility of a competent medical advisor, must all enter into our calculations. Depending upon the existing destruction of lung tissue, the presence or absence of bronchiectasis or emphysema, the condition of the heart and the tendency toward hemoptysis, together with the expansion and capacity of the unaffected tissue as determined by the tape and spirometer, we vary our requirements as to altitude and atmospheric pressure.

Following a definite and preconceived plan of procedure in our treatment by which we are to place our patient in the best possible surroundings and under conditions which will enable a resumption of normal physiological processes, too much dependence cannot be placed upon the minor and easily overlooked details of hygienic measures; to the advantages to be derived from bettered climatic surroundings, if at the disposal of the patient, we are to add the adoption of proper clothing, preferably woolen and of weights adapted to the season; of exercise, daily and regular in amount, and controlled by the fatigue and temperature range of the patient, stopping short of the one and discontinued when the temperature is over 100 4-5; daily bathing, preferably in the morning, followed by dry friction, the patient standing in a foot tub of warm water and sponging the body rapidly from head to feet with water at a temperature of 65 to 70 F., followed by an equally rapid and vigorous drying by means of a rough towel. The adoption of regular hours for mental and bodily rest, and the judicious employment of general and chest gymnastics are also measures worthy of attention.

The question of food is one of infinite importance. Our knowledge of the dependence of the healthy individual upon the proper assimilation of proper foods, and of the general disturbance produced by any local and transitory gastric or intestinal fault, must warn us of the necessity of guarding against any errors in dietetics during the treatment of a pulmonary tuberculosis Our hope of influencing tissue restoration and of promoting cell nutrition come to a sudden end when gastric disturbances intervene.

The choice of foods and the hours for feeding are questions to be separately decided for each individual case. In cases unaccompanied by gastric indigestion possibly the better results are to be obtained by allowing the use of such foods as they are accustomed to in health, gradually increasing nitrogenous and fatty foods, as butter and cream, and lessening the amount of carbo-hydrates, as materials not easily digested and liable to cause gastric disorders. When, and unfortunately it is of frequent occurrence, we are to contend with an irritable stomach and anorexia, it is wise to restrict the diet to liquid, or other easily assimilable forms of food, with the aim of restoring gastric function as rapidly as possible, above all avoiding "forced feeding" in the hope of maintaining body weight at the expense of prolonging gastric derangement. Often an absolute cessation of stomach feeding and a resort to rectal alimentation will tide our patients over these attacks without appreciable loss of ground.

Excepting these medicinal measures directly applicable to influencing the course of the intrinsic processes of the disease, but little medication is necessary, being detrimental to the maintenance of that perfect digestion which it should be our object to attain in each individual case.

The control of symptoms and of the accidents of the disease should be by measures as devoid of stomach medication as possible. Temperature is usually controllable by enforced rest, bathing, or, if necessary, by the use of the simpler apyretics. Sweating, by the hypodermic use of atropine or picrotoxin. Cough and expectoration, by heroin or codeine. Neuralgic pains and the fugitive nervous disturbances of the ordinary case are to be disposed of with as little recourse to internal medication as possible. A careful watch should be kept upon the patient with a view to maintaining proper functional activity of the skin, liver, kidneys and bowels.

Of the accidents of tuberculosis we may include hemoptysis, the milder variety of which, due to the rupture of bronchial or pulmonary capillaries or to interstitial hemorrhage, is rarely of alarming extent, and may be controlled by absolute rest upon the back, morphia, and atropia hypodermically. In the violent and profuse form, which is usually due to the rupture of an aneurismal artery in the wall of a cavity, the same procedures, plus the application of ice bags to the chest, will meet the indications. Absolute rest for 48 hours after cessation of the hemorrhage should be insisted upon in all cases.

When we come to a consideration of the medicinal remedies and measures applicable to the relief of the disease itself, we are immediately confronted by a mass of agents with more or less substantial claims upon our attention. Selecting those remedies which have stood the searching tests of time and of repeated application, and eliminating from groups of remedies with practically identical therapeutic action those of lesser import, we may roughly divide those claiming our attention into: (a) Those of value by their general systemic effect; (b) those directly applicable, locally, to the diseased tissue; and (c) those more directly concerned in establishing an antagonism to the specific micro-organisms.

Of the general remedies, gold, arsenic, iodine, the hypophosphites, codliver oil, iron, the mineral acids, nux vomica and its alkaloids, and the various forms of condensed and modified food preparations, have always had, and will probably long retain, their usefulness. Yet I feel that a note of warning should be sounded in regard to the tendency to over medication, and that we should appreciate that there is a limit to the tolerance of nauseating drugs.

There have been serious efforts made, many antedating our knowledge of the pathology of the disease, to attack the local manifestations directly. Pneumonectomy of diseased tissue has been advocated as a surgical measure, and failed. The intra-pulmonary injection of nitrogen and other gases have failed in giving the results which theoretically were promised. Progressive intensive mineralization proves of value in so few cases as to negative its general employment. Our attention is turned more particularly to the advantages to be derived from the use of fine or coarse sprays, medicinally impregnated, applied by inhalation or by direct intra-tracheal spraying. It is extremely probable that we are able to accomplish some good results by this method, as undoubtedly the condensation of the coarser sprays will reach the smaller bronchial divisions and exert a decided effect upon the portions of the infected tissues with which they have come in contact. Benzoic acid, creolin, pyoktanin and thymol, the oils of creosote, eucalyptus, gaultheria and pinus pumilio will all be found to be of benefit in these local measures. In this connection I may say that the best results to be achieved by attempts at local medication have been gained at my hands by the use of formalin, the application being effected by the sprinkling of a 6 per cent. watery solution upon an absorbent bib so arranged immediately below the chin of the patient that the ascending gas is drawn into the bronchi by the ordinary respiratory efforts. A moment's consideration of the pathology of the disease, and a comparison with the methods and technique necessary to accomplish asepsis in accessible portions of the body, will convince us that the relief we may hope to gain by these measures must necessarily be of slight extent. I am convinced, however, that they are valuable adjuvants in preventing extension by the mechanical aspiration of infected sputum to deeper recesses of the lung tissue, and that they give decided relief from the suppurative processes following the secondary infection of bronchiectasis, and in cavity formations.

With our incomplete knowledge of the more complex chemical processes involved in the production of the vital antagonism to the disease, our knowledge of the subject, though admittedly incomplete, has passed far beyond the stages of experimental and conjectural therapy. We have already advanced well in our efforts to stimulate the production of this antagonism by the climatic, hygienic and therapeutic measures which have been indicated, all of which are but means to the end we desire to accomplish, that of furnishing the body laboratories with supplies and strengthening the inherent tendency of the vital tissues to meet the invasion to which they are being subjected.

Unquestionably, the tendency to the elaboration in the economy of these antagonistic conditions is an inherent attribute of every individual, varying in intensity with the inherited or acquired "vital energy" of the individual.

The universally accepted testimony of unquestionably competent observers is to the truth of the phagocytic theory of Metchnikoff, to the effect that the poly-nuclear white corpuscles of the blood are active agents in preventing or retarding the multiplication of pathogenic bacteria in the body, which they destroy by virtue of some constituent or secretion; the humoral theory, advanced by Buchner and others, claiming the germicidal properties of the blood serum is also true, the germicidal properties being due to a substance or substances which originate in the poly-nuclear white cells. The logical sequence of these admitted facts is that the natural resistance of the body to bacterial disease will be strengthened by a physiological increase in the production of these poly-nuclear white corpuscles, and the discovery of nuclein has provided us with a substance by the introduction of which into the body we may produce a decided increase in the number of these blood elements and a consequently increased elaboration of germicidal substances.

The lines of procedure thus hastily indicated cover the rationale of the methods by which we may hope to assist the individual in the auto-elaboration of those body chemistries and vital processes concerned in the elimination of the disease, through the building up of general vitality by a combining of measures to increase general nutrition, and to excite and stimulate the physiological processes by which we trust to raise the lowered morale of the tissues, and thus increase the standard of inherent resistance to the disease.

We now turn our attention to the possibility of producing in the individual an increase in the condition of immunity or resistance to the disease, temporary in character, but of sufficient intensity to supplement the natural resisting powers to such an extent as to definitely check the extension of the pathological processes, and to terminate eventually in the elimination of the bacterial element by the antagonism produced to its propagation, plus the natural reparative efforts of the individual.

The fact that such an acquired immunity to other infective diseases was possible of accomplishment led to the investigations which resulted in tuberculin being announced to the profession by Koch in 1890, as an incomplete product, yet capable of producing decided changes in the pathology of tuberculous animals, consisting of a concentration to one-tenth bulk of the glycerine-bouillon medium upon which tubercle bacilli had been grown to maturity, the varying amount of toxins occurring in consecutive productions and consequent varying of immunizing strength led to its abandonment by Koch.

Following this, as the result of further experimentation, Koch announced a new product, Tuberculin R., the essential steps in the production of which consisted in the pulverization of virulent tubercle bacilli and the maceration of the resulting powder in distilled water, followed by centrifugation. Experimentation with the clear fluid thus obtained resulted, however, in its withdrawal from the market by Koch in 1898, it having been demonstrated to be rather an emulsion than a solution and, in some instances, to contain virulent tubercle bacilli.

This has been followed by a variety of modifications at the hands of different experimenters, of which the watery extract, elaborated by von Ruck, in which the removal of fats by treatment of the pulverized mass with ether allows of a watery solution of the tubercle bacilli, the solution thus effected being passed through a porcelain filter. This is probably the most satisfactory immunizing agent we now possess, and its use in selected cases is productive of decided effects. The advisability of the use of anti-toxins in the form of serums is receiving much attention. The difficulties in the way have consisted in the obtaining of a toxin for the progressive immunization of the animals, of sufficient potency to produce a serum of sufficient immunizing strength. Whichever form of immunizing agent is employed we should appreciate the necessity for its careful administration, accustoming the individual to its presence by gradually increased dosage, and above all should we appreciate that long periods of systematic treatment by these methods will be necessary for definite results.

In conclusion, it is my candid opinion that by a judicious and combined employment of the measures now at our disposal we may cure early tuberculosis, especially in those in which inherited susceptibility is not a prominent etiological factor, and that in more advanced stages we may profoundly modify the course of the disease, prolonging life and the capacity for the ordinary vocations far beyond the limits of what was considered possible a few years ago.

That the further elaboration of remedial measures by a more thorough understanding of the artificial immunity to be produced by products derived from the tubercle bacilli themselves holds our hope for the future, and that marked advances over our present productions in this line will be accomplished in the near future is my profound conviction.

REVIEW OF CURRENT LITERATURE.

MODES OF DIFFUSION OF TUBERCLE BACILLI.

Moeller of Goerbersdorf (Zeitschrift fuer Hygiene and Inf. Krankh. 1899, XXXII., Heft II.) states, that since Fluegge made his claim (in 1897) that the spray projected by the phthisical cough was more to be feared as conveying infection than dried and pulverized sputum, he himself has worked strenuously upon this subject, repeating Fluegge's experiments and varying them in every possible way.

He moistened glass slips with glycerine or gelatine and suspended them over the beds of consumptives in all stages, at various hours of the day, for longer or shorter intervals of time, and at all distances up to a meter.

About one-half of all phthisical subjects whose sputum contained bacilli were able to project infected particles of spray upon the glass slips. The morning and evening hours appeared to give the better results. In some cases even a few acts of coughing were enough to contaminate the prepared slips, while in other cases an exposure of hours was required for success of the experiment. It was repeatedly ascertained that the sputum of a given patient varied much as to the number of bacilli at different hours of the day. Greater numbers were found in cases in which considerable expectoration had just taken place. Patients who coughed up thick, coherent, nummular sputum were contrasted with those who had watery sputum, and with the latter many more bacilli were observed to be projected in the air.

Bacilli were usually found on the slips in groups of two, three or more, surrounded by mucous; occasionally elastic fibres were also found, and in one instance an entire alveolus containing eight bacilli.

The saliva of these patients was frequently examined for bacilli, but only in a few instances were they found. Moeller has often examamined particles of sputum projected against the throat mirror during laryngoscopy, and has found tubercle bacilli in them.

It therefore appears that the pharynx and naso-pharynx of consumptives must often harbor bacilli which have been coughed up from the lungs. The author has also experimented with Fraenkel's protective mask to show the possibility of its contamination by the expired air in coughing, but only in a small number of cases did he obtain positive results.

He found that in the projected spray there is no definite relationship between the severity of the disease and the number of contained bacilli. Possibly the muscular development of the individual may explain why a patient in the earlier stages of the disease may project far more than another in the later stages.

Another object of his investigation was the contamination of the air, etc., by coughing. The reading room of the Goerbersdorf sanitarium was frequently occupied at a single time by some 200 consumptive patients assembled to see theatrical performances. At these entertainments there was often much laughter, with following paroxysms of coughing. After the close of a performance, lasting from two and one-half to three hours, the author pumped the air of the room through a sandfilter, washed the sand in bouillon, and tested the washings in all the customary ways, with negative results. On the other hand, positive results were obtained from the dust on the walls and from leaves of ornamental plants. The bacilli found could not have come from ordinary sputum, because every patient uses a Dettweiler expectoration flask. The bacilli were found virulent in these experiments in one case out of five.

Moeller also examined healthy people employed about the institution for the presence of tubercle bacilli, and in one out of seven men servants they were found in the nasal mucus. Out of another series of eighteen female servants, who cleaned up the rooms of the patients, two had bacilli in the nose.

Other experiments were undertaken to determine whether or not animals directly exposed to the spray projected during cough would become infected. The animals were placed in boxes so arranged that the tuberculous patients could cough directly upon them and contaminate the air which they breathed. Out of eight animals so exposed two became infected and actually died of inhalation tuberculosis. The exposure was kept up several hours daily for several weeks. The lesions found on autopsy were typical pulmonary tuberculosis, single nodules in the omentum, and cheesy bronchial glands.

In conclusion Moeller expresses his belief that flies are a factor in the dissemination of tuberculosis. Bacilli are readily demonstrable both upon and within these insects, and also in their excrement. In tenement houses flies may be seen swarming upon tuberculous sputum when it lies upon the floor. The same flies may readily contaminate the food when it is upon the table, as well as the tableware. This method of transmission may prove to be a frequent cause of infection of young children, and a new feature in prophylaxis should be the segregation of flies from the sick-room and from food.

(Like experiments have been made by Cornet in 1889, and are reported by him in his work on Tuberculosis, page 209. In four out of eighteen cases they proved positive. It is, however, to be noted that neither his or Moeller's experiments, nor those of Fluegge, conform to the exposure that a person would be liable to, in the ordinary association with, or care of a consumptive, and it is hardly necessary to point out that one would not be likely to stand for hours each day in front of the consumptive's mouth and let him cough in his face! That with violent or explosive cough saliva and, at times, sputum particles, may be projected, has been well known to phthisio-therapists for many years. and every laryngologist has seen them upon his mirrors, or felt them upon his face. Such particles, however, obey the law of gravity, and do not remain suspended in the air, and if any therein contained tubercle bacilli ever become a source of danger, they become so, as Cornet has shown, through dried sputum, whether projected with the cough in minute particles or expectorated by the mouthful, with this difference, that the mouthful usually contains tubercle bacilli by the hundreds of millions, whereas the little particles are usually free, or exceptionally contain two to four bacilli, and this relative proportion of bacilli is the measure of the relative danger shown to exist between expectorating upon the floor and coughing into the air. It is, however, well to guard against all danger, and the rule which the writer has heretofore recommended, which consists in requiring patients to hold a cloth or paper napkin before the mouth while coughing, is evidently good, inasmuch as repeated experiments for the demonstration of tubercle bacilli in the dust upon walls and furniture of the bed rooms and general rooms of his institution have always proven negative. Such a simple precaution is easily carried out and readily complied with by patients.—Editor.)

MEASURES AGAINST TUBERCULOSIS OF DOMESTIC ANIMALS.

Bang of Copenhagen (Journal of Comparative Pathology and Therapeutics, September 30, 1899) states that tuberculosis in animals must be combated for the protection of mankind, and, in a secondary sense, to prevent the economic loss of the animals themselves.

The disease is most common in cattle, and it is the sick cow which is the greatest menace to the human race on account of her economic uses. With regard to congenital tuberculosis in cattle, Bang has personally seen over 100 cases, yet the condition occurs but rarely, affecting but one-third of one per cent. of the slaughtered calves.

An embryo calf cannot become tubercular unless the maternal blood and placenta are first infected. If newborn calves are tested with tuberculin the number which react is less by far than that obtained in yearlings. Of inherited predisposition in cattle little or nothing is known, but it appears safe to say that the bovine species possesses no natural immunity and that every animal will acquire the disease after proper exposure. Per contra, a calf born sound will remain healthy as long as it is protected from infection. The author opposes the belief that bulls which do not react to tuberculin are less likely to become infected, and objects to this method of selecting breeding animals as untrustworthy. A bull which does react to tuberculin may be clinically sound, with healthy semen, while a bull which does not react may, after some months of cohabitation with a herd of cows, in which there is tuberculosis, react to a second test.

With regard to the manner in which the infection of cattle takes place, veterinaries recognize infected food and cohabitation as furnishing the greatest number of infections. In calves which react to tuberculin, the retropharyngeal and mesenteric glands are the first, and perhaps the sole, depots of the bacilli, this localization indicating a food infection. Nursing calves are not only exposed to the milk of tuberculous udders, but, even when the udder is free from the disease, the milk may be contaminated in cases of generalized tuberculosis.

Again, bacilli from the faeces of cows may be the means of infecting normal milk, as claimed by Eber. In Denmark young calves are fed by hand with milk which has been heated to 85° C., thus doing away with all of these sources of danger. Until this custom becomes general we must look out for the tuberculous udder, as it is by far the most common source of infected milk.

In the late stages of the disease it has been a custom to milk the cows on the floor of the shed, thereby exposing the rest of the herd to infection. A law has recently been enacted in Denmark which compels slaughtering of all cows with tuberculous udders as soon as the diagnosis is made. When diseased cows are slaughtered the tuberculous tissues should be destroyed, and the apparently healthy portions should be cooked, thus obviating a source of infection of pigs, cats, dogs, fowls, etc.

In older calves and adult cattle the chief source of infection is cohabitation of diseased with sound animals. The actual modes of transmission are numerous. Drinking from a common vessel is thought to be sufficiently dangerous to sanction the necessity of a separate drinking vessel for each animal when stall fed. The common drinking trough must give way to the individual drinking pail. A fruitful source of danger is old timber in the cowshed; but even in new and sanitary sheds it is difficult to keep the woodwork clean. In the course of months and years, despite cleanliness, the shed becomes infected and an entire sound herd may be rendered tuberculous. Bacilli are given off from the infected animals in the various excreta, and may be taken up by the healthy in a dried or moist condition. It is thus evident that our first prophylactic step must be to separate infected from sound animals. Tuberculin has rendered this separation much easier than it used to be, but its use is not infallible. Of animals which do not react, at least 90 per cent. may be regarded as free from tuberculosis. Of the 10 per cent. which do not react but are nevertheless tuberculous, and often in a high degree, clinical measures are often of value in diagnosis. Another weak point in tuberculin diagnosis is that after repeated inoculation animals may acquire a tolerance. A cow may react to a test, but, repeated, the reaction may fail. This toleration is, however, only temporary, but dishonest breeders or dealers have already learned to palm off a sick for a healthy animal by giving several inoculations in rapid succession, after which the test fails when made in the presence of the buyer.

Cattle which have once reacted ought to be branded to prevent this kind of imposition. No apparent cure should ever justify placing a branded animal in a sound herd.

Cattle which have been on a journey (to market, transfer to new herd, etc.) generally react but slightly, or not at all, until some time has passed. This peculiarity is held to be due to the inhibiting effect of mental excitement on the heat centre. On this account a buyer should not hastily accuse the seller of trickery when a later test gives a reaction.

After the diseased animals have been weeded out as far as possible, the sound and reacting herds must be kept apart. The reacting herd requires special attention, and when any member of it has an actually virulent discharge from the udder, uterus or intestines, or ulcerated lungs, it must be isolated and slaughtered. The quarters of the non-reacting herd must be disinfected.

With regard to the statement that cattle are frequently infected from human sputum, recent experiments have shown that cultures obtained from bovine tuberculosis are far more virulent to the ox than bacilli derived from human tuberculosis.

After speaking of the progress made by various nations in the warfare against bovine tuberculosis, Bang sums up the requirements for the veterinary crusade as follows:

1. Educate stock owners as to the nature of tuberculosis, the tuberculin reaction, etc.

2. Stock owners must first place the newborn calves out of danger, so that the next generation of cattle may be sound; and then,

3. Separate the healthy from diseased cattle, and destroy the latter. This step can hardly be brought about unless made compulsory. The owner must be taught to regard as suspicious all cases with chronic chest disease and emaciation, vaginal discharge not due to retained placenta, udder disease and chronic diarrhoea. He must isolate all such cases and send them to the veterinary.

4. Special attention must always be paid to the condition of the udder, since this organ is the source of the infection of the next generation of cattle.

5. Public creameries, the milk of which is responsible for the infection of many hand-fed calves, should not be allowed to sell the separated milk until it has been heated to 85° C.

Dr. Bang, at the close of his paper, which was read before the Seventh International Veterinary Congress, stated that he hoped the members of the Congress would make recommendations similiar to those suggested by him to their respective governments.

THE PROSPECT OF ABOLISHING TUBERCULOSIS.

Ransome (Transactions of the Epidemiological Society of London, Vol. XVIII., 1898-1899) states that all attempts at crushing out tuberculosis should be preceded by a general survey of all the opposing forces and of all the allies of the movement. This task he attempts to solve in the following study of the disease.

What is the extent of the undertaking? The disease is ubiquitous, and the more people are massed together the better the disease is able to flourish. Statistics are of value only as far back as 1860 or thereabouts. The figures of the registrar-general, which extend to 1838, are untrustworthy. Many fallacies regarding consumption were prevalent at that period. Still it often happens that one fallacy is compensated by another. Cases of marasmus from other causes than phthisis were undoubtedly included, while many cases of tuberculosis passed unrecognized. Accepting these early figures for what they profess to be, the mortality from phthisis has declined from 3,800 per million living in 1838 to 1,305 per million living in 1896. Despite the inaccuracy of the early figures, there can be no doubt that a great decline in the mortality of the disease has taken place. At this rate of diminution, in thirty years we would witness the extinction of the malady.

Analyzing the decline, he points out that it was present to a marked degree in the forties, at which period we had no disinfection or other resource. However, the result of general sanitation, drainage, etc., was beginning to make itself felt at that time. No further reduction in the decline occurred until 1867, the disease appearing to hold its own; but from 1867 to the present day the decline has been continuous. During this period sanitary science began to rapidly improve—dwellings, food, clothing, everything in fact which pertains to the poorer classes, has undergone some improvement, and great sanitary works have been constructed. We cannot justly attribute this decline to any measures growing out of the science of bacteriology.

There are probably 300,000 cases of tuberculous diseases in the British Isles, in which the disease has been recognized, to say nothing of latent and beginning cases. That the latent cases are very numerous is borne out by the 20 to 30 per cent. of cadavers with healed and chiefly unsuspected tuberculosis. Domestic (and captive) animals and birds with tuberculosis exist by the hundred thousand.

What are the sources of strength possessed by the bacillus?

It exists in immense numbers and possesses remarkable tenacity of life under certain circumstances. It may resist all the changes of the seasons, wet, dry, freezing and considerable heat. It contaminates the milk supply. The disease itself begins insidiously, is very chronic, has a long incubation period.

Again, the bacillus works synergistically with other pathogenic bacteria, especially the pyogenic cocci, and also produces toxins of great virulence.

Animals readily contract the disease from man and transmit it again to its original source. Finally, ordinary disinfectants do not destroy the bacillus.

What, on the other hand, are the sources of weakness of the bacillus?

It has a definite tendency to lose its virulence, and this quality tends to somewhat oppose its prodigious numbers, ubiquity, longevity and vital resistance. This fact is very evident in laboratory work, for, unless the cultures are continually passed through animals, they soon lose their original virulence. The bacillus is readily destroyed by sunlight; and ventilation, even in the dark, weakens its virulence. Infectious dust from dried sputum cannot be formed in light, airy places. Man possesses a good deal of natural resistance to the action of the bacillus and, in comparison with certain animals, has a relative immunity to the disease. The long incubation period also serves to protect mankind, because, as long as his general condition is good, he need not fear the outbreak of the disease.

The exhaled aqueous vapor, viscid mucous, the action of cilia, chains of protecting lymphatic glands, and the phagocytes, all tend to antagonize the action of the bacillus.

Koch's discovery of tuberculin, as a test for the presence of the disease, is one of our great resources in fighting the plague, because it unmasks it. Finally, the drying of the subsoil, through drainage, operates in some unknown manner against the disease. There are many other factors, some friendly, some hostile to mankind in his warfare against tuberculosis—diseases, occupations, habits, etc.—which need not be considered here.

What, now, is the prospect of victory? At present, mankind has decidedly the upper hand of the disease, as shown by the decline in the death rate. Since this drop in the mortality is due so thoroughly to sanitary engineering, we must continue our work in the direction of sewerage, subsoil drainage, ventilation, etc. All unsanitary property should be condemned if it cannot be made fit for habitation. Smoke and noxious air nuisances should be abated, and a proper amount of park space, straight, wide streets and a due proportion between the height of buildings and the width of streets should be maintained. All sides of dwelling houses should be exposed to air and light, and blind alleys should be abolished. The author here apologizes for going into general sanitation; his excuse is that most authors neglect this side of the matter.

Notification of cases of the disease should be made to the sanitary authorities. Circulars regarding disinfection should be given to all patients so reported. Isolation is in order if these directions are persistently ignored. Hospital accommodations must be furnished for the destitute. Sound herds of catttle must be formed, after which it ought to be easy to keep them free from the disease.

Judging from the past, and from mankind's warfare against other diseases, the author concludes that thirty years more ought to suffice to arrive at complete victory.

(While this paper contributes nothing new or specially important, its substance is given because of the naive optimism of its author, which, though not at all likely to be shared by any practical student of the subject, shows what remarkable conclusions men are likely to arrive at when they study a subject at their desk from statistics, whether of the registrar-general's office of the British Isles. or any other source.—Editor.)

TUBERCULOSIS IN CHILDHOOD.

Monti of Vienna (Wiener Klinik, July and August, 1899) well known as an authority on this subject, has published a study of tuberculosis in childhood, as distinguished from scrofula, which he regards as practically a separate affection.

In an introductory section on the bacillus he emphasizes its reluctance to grow an artificial media; the unfavorable influence exerted upon its growth by the presence of other (especially putrefactive) germs; its short life even under favorable conditions (he, however, conceded that it may survive in the dried state for a prolonged interval); the nearly lifeless condition under which it exists in abscess cavities, sputum, etc.

In the light of our present knowledge, the author says, it is wonderful that a germ so perishable and so vulnerable can play such an extensive role in the genesis of disease. The effects of the bacillus appear to be due to a "toxomucin," having a powerful necrotizing action.

When the bacillus is implanted in the skin or a mucosa it causes either acute tuberculous ulcers or lupus. Beneath the skin its presence gives rise to tuberculous abscesses. Taken up by the lymphatics, it causes the well-known glandular lesions. It is also evident that the germ may be forwarded by the blood or lymph stream to almost every locality of the body.

In the tuberculoses of the newborn, the author sees evidence that the maternal ovum may be infected from the mother, or by the paternal seminal fluid; later the embryo may be infected by the placental route or amniotic fluid when the mother is tubercular. These modes of infection, while theoretically possible and occasionally actually authenticated, are nevertheless extremely infrequent in practice. By whichever of the above-mentiond routes the bacillus has gained entrance to the foetal organism, there is no doubt that it may invade it and remain latent therein for an indefinite period. But, unless the bacilli are actually found within the tissues, it is extremely difficult to uphold the view that the infection has not been acquired after birth.

This mode of treating the problem of the origin of phthisis has, therefore, been abandoned for the more practical view of the inheritance of a peculiar disposition which is acted upon pathologically by the practically ubiquitous bacillus. But even the predisposition is viewed from differing standpoints. While some authorities see only a general state of malnutrition which invites the pathogenic action of the germ, others behold in this so-called tuberculous diathesis the results of the subtle action of the toxic products of Koch's bacillus, which, implanted within the organism during its antepartum existence, has exerted a sort of stunting action upon the normal development of many of the tissues of the body.

The very dubious nature of the entire subject of heredity and antepartum infection has led to an extremely careful study of all the possible phases of infection of the newborn.

Mother's milk has been closely studied and the possibility of infection through this channel cannot be denied.

Contact of the delicate, perhaps abraded, skin of the young infant with tuberculous sputum may result in inoculation, as has been abundantly shown in connection with ritual circumcision.

Lodgment in the upper air and food passages of dust impregnated with the bacillus may lead to infection, especially in children with chronic rhinitis, adenoids and enlarged tonsils.

The bacillus may be swallowed in a virulent state and especially in the milk of tuberculous cows. It would ordinarily appear surprising that in this connection the author does not touch upon the absorption of the bacillus through abraded surfaces without production of cutaneous and mucous lesions, the infection being first apparent in the enlarged cervical and abdominal lymphganglia. The only explanation of this omission is the fact that he regards scrofula as somewhat different from well-defined tuberculosis. (Prof. Monti has in fact reported an analysis of over 8,000 cases of scrofula during the present year, in which he advocates the differentiation of the two affections).

The author divides his subject from the clinical and pathological standpoint into general miliary tuberculosis, pulmonary phthisis, tuberculosis of the bronchial glands and finally intestinal and mesenteric tuberculosis.

Aside from the obscurity attendant upon the evolution of the disease in nurslings, the pathology and symptomatology of tuberculosis in childhood are well outlined in standard works, and the author does not add materially to our knowledge of these phases of the subject. His gloomy prognosis of tuberculosis in childhood, as distinguished from scrofula, tends to render a discussion of its pathology somewhat barren for the practitioner.

In this connection it may be of interest to refer, briefly, to the article on scrofula already alluded to, its full title being: "Statistische Beitraege zur Lehre von der Scrophulose," appearing in the Archiv fuer Kinderheilkunde, 1899, Bd. XXVI. For the purposes of analysis the author used a little over 8,000 cases which were under his personal supervision during a stated term.

Girls considerably outnumbered boys. The period between the ages of one and five years claimed considerably more victims than the two succeding quinquennia. The percentage of cases under one year of age was relatively small.

During the observation period there were but 133 deaths in this large number of cases, or less than 2 per cent, this being in striking contrast with the high mortality of tuberculosis in childhood, and a strong argument for the clinical differentiation of the two maladies. Nevertheless, the author admits that scrofula is in part of a tubercular character. One, therefore, naturally asks, What does Monti really understand by scrofula?

To begin with, he divides it into three stages. The first stage includes only the so-called disposition, with the stigmata so well known to clinicians, including slight enlargement of the lymphganglia, anaemia, weak heart and so on through almost all the organs and tissues of the body, each of which exhibits defects of structure or function—simply the strumous diathesis without any frank lesions.

The second stage consists of various inflammatory processes involving the skin and mucosae and exhibiting a disinclination toward resolution. To this stage belong strumous ophthalmia, otitis, eczema, rhinorrhoea, simple cervical lymphoma, periostitis, etc. Thus far, i. e., in the first two stages, Monti does not recognize the pathogenic action of the bacillus tuberculosis as in any sense a factor in the production of these alleged scrofulous lesions.

The third stage includes such lesions as Pott's disease, hip disease, and other locations of caries, fungous joint disease, etc. The bacillus tuberculosis has now appeared upon the scene, yet the mortality rate of this advanced or "tuberculous scrofula" is not high (about 8 per cent.), and over a third of the deaths result from amyloid disease.

About the same number, however, died of pulmonary or meningeal tuberculosis In other words, of about 1,500 children in the third stage of scrofula, only about fifty, or a little over 3 per cent., actually died of tuberculosis during a protracted period of observation.

Under the section on Tuberculosis of the Lymph Glands, in his pamphlet on "Tuberculosis in Childhood," Monti considers only localizations in the bronchial and mesenteric glands. He does not mention any of the tubercular bone and joint diseases in this work, but describes them very fully in his sketch on scrofula. This separation of material appears opposed to the spirit of the time, but, since the mortality of these osseous and arthritic lesions is low, and as many die of amyloid disease as of tuberculosis, Monti may be right in adhering to the old custom of terming them scrofulous.

In his own summary upon his article on scrofula, he says that the latter must be distinguished from tuberculosis, since there are two distinct stages in which all signs of the bacillus are undiscoverable. Even in the third or quasi-tuberculous stage, 60 per cent. recover completely, while only 8 per cent. die, and less than one-half of this number die of tuberculosis.

To the reviewer this differentiation appears of no material value, unless we interpret it so, that although the so-called scrofulous and tubercular affections are due to the same cause, clinically it is shown that so long as the affection does not invade parts or organs essential to life, or causes destructive secondary lesions which jeopardize it seriously, recovery may, and usually does, take place.

This we would expect in tuberculosis of the glandular and lymphatic system, and the benign course of it is not a matter of surprise.

ON ENLARGED GLANDS IN CHILDREN.

Schleich, of Berlin, contributes an original article to the October 1st issue of Pediatrics, which abounds in suggestions of great interest to the student of tuberculosis. He states that some years ago it was his custom to extirpate all enlarged lymphganglia in scrofula, upon the theory that they were depots of virulent material which constantly menaced the welfare of the organism at large. He came, however, to a radically different conclusion in the course of time, and his change of opinion was based on several weighty premises, the first being that he found that these glandular swellings can undergo resolution under conservative measures; the second and more important one he established by special investigation extending over years, namely, that the extirpation of the combined ganglia of a given locality undoubtedly exposed the subject to greatly increased risk of peripheral infection from various infectious disease—erysipelas, lymphangitis, sepsis, tuberculosis, tetanus (?), etc., etc.

If extirpations were really as radical as the surgeon intends them to be, this deprivation of protection on the part of the ganglia would be much more apparent than it is at present. Schleich appears to think that the rationale of the supervention of general tuberculosis after extirpation of the lymphganglia of the neck may be due in some cases to deprivation of the organism of its natural protection. He unfolds in great detail his theory that immunity toward disease has its seat wholly in the lymphatic system; hence he antagonizes all theories of anti-toxin, which naturally fix the seat of immunity in the blood. The arguments which he adduces in support of his theory are seductive, but need not be recited in this connection, as they involve the whole subject of pathology.

Schleich, however, emphasizes the fact that the indications for the treatment of the various stages and degrees of scrofulous lymphadenitis are by no means clearly outlined; this omission he would rectify. Total extirpation of the glands is never justifiable save in malignant disease; this is his first generalization. Pure inflammatory hyperplasia, even when eminently chronic, may be controlled by appropriate diet and medication. Our treatment must be based upon the three-fold termination of this condition—resolution, caseation, suppuration. Termination by resolution is effected by fatty degeneration of the hyperplastic tissue. In order to determine whether or not resolution is being accomplished, the general condition of the patient must be our sole guide. If the little patient is in perfect health, the size of the swelling as well as its duration need not militate against the benign character of the process. In all cases in which there is no apparent flaw in the general health, good general regimen ought to be followed by a resolution of the enlarged glands. It is here that Schleich introduces one of his characteristic innovations—which, by the way, are often rehabilitations of pristine views—namely, that the action of mercury and iodine in syphilitic granulomata is by no means specific, but equally applicable to all conditions in which cellular hyperplasia tends to disappear through fatty degeneration, and therefore fairly indicated in scrofulous adenitis; he therefore makes use of the "mixed treatment" in the routine management of these cases and, as he claims, with the best results.

Considering the great contingent of "borderland cases" in which there may be suspicion that caseation, or even suppuration, has set in, the claim is made that since the mixed treatment will promote the resolution of a syphilitic gumma which has already undergone destructive change, it ought to be, and actually is, equally beneficial in a hyperplastic lymph gland which is beginning to caseate and even to suppurate. This statement has a revolutionary sound, yet we must bear in mind the fact that many eminent clinicians of the past—and we may cite the elder Gross as a representative—upheld practically the same view a generation ago; with the exception that Gross looked upon scrofulous glands as a feature of inherited syphilis.

He looks upon the "status lymphaticus" as a predisponent to caseation and suppuration in subjects who have enlarged glands. When there is any evidence whatever of this "status lymphaticus," as shown by pallor and anaemia, thickened lips, eczema, rhinorrhoea, ophthalmia, etc., the author advises against any form of surgical interference with the glands, on the ground that it would be merely removing a symptom while the underlying condition would persist; the full general regimen being indicated in these cases.

The author agrees with most practitioners as to the inexpediency of operating when the caseous glands have become welded into a common mass with the larger blood vessels; only when life is thereby absolutely threatened does he believe in interference in such cases.

The true caseous gland may often be distinguished from the purely hyperplastic structure in that the latter are rounded, succulent, plum-like, while the former are angular and feel beneath the surface like a plum-stone. The caseous gland may appear less adherent to its environment and more movable than does the merely hyperplastic structure.

When dietetic measures and general regimen, as well as the mixed treatment, have failed to modify the course of scrofulous glands, Schleich believes in the least possible degree of surgical interference; the enlarged gland is split in two and any caseous material is removed with the curette. The merely hyperplastic portion of the gland undergoes resolution thereafter, while its protective function is not compromised, and the danger of a sudden generalization of tuberculosis is reduced to a minimum.

When suppuration has actually taken place simple incision and drainage suffice if there is a single acute abscess. But if there are chronic, multiple foci, with a tendency to burrowing, each suppurating focus must be laid open, while the pyogenic surface must be extirpated as far as is practicable without meddling with the capsular tissue of the ganglia. From interference with this latter we may expect either generalized infection or dangerous haemorrhage.

The author's conclusions are as follows: "There are far too many cases of total extirpation, where methodical enucleation or simple incision would have fully sufficed for a cure. Extirpation of lymph-ganglia in children with the lymphatic dyscrasia is an error, for it is the constitution which is diseased. Cheesy hyperplasia should be treated by enucleation, provided that a fat diet, iodide of potash and mercurials fail to produce resolution. A syphilitic taint underlies cheesy glands oftener than is generally believed, which makes the advisability of specific medication the more urgent in these cases. In simple abscess we should incise and tampon, while in multiple suppuration we should carefully extirpate the foci without any attempt to excise the adherent capsule. When the glands are the seat of tumor-like enlargements, the most radical treatment is the most rational procedure."

He concludes by stating that he is well aware that his views will be regarded as revolutionary. He thinks that we are just entering upon a period of rational conservatism as a reaction from an epoch of unwarrantable surgical interference. The management of enlarged glands is especially likely to feel the impetus of this change of front on the part of the profession.

PROPHYLAXIS OF TUBERCULOSIS IN CHILDHOOD.

In "La Tuberculose Infantile," October 15, 1899, appears a translation of a paper by Professor Huebner read before the recent Berlin Congress.

The author says that many cases of tuberculosis which appear to begin in adult life in reality date from an infection received in tender years, pulmonary catarrhs lighting up old latent tubercular processes more frequently than is generally believed. The scrofulous child may become tuberculous in after life, and it is in the scrofulous that we look for latent tuberculous deposits to become active. In protecting the child from tuberculosis we not only preserve its health, but frequently save its life.

To perform this task we must first of all be able to answer the question, "How does the child contract tuberculosis?" For if the disease were hereditary it would be far more common in infancy than it actually is.

During the past five years Huebner has had under observation 844 nurslings between the ages of one day and three months, and among them there occurred not a single case of tuberculosis; of 218 between the ages of three and six months, eight became tubercular (3.6 per cent.); between the ages of six and nine months the percentage increased to 11.8 per cent., and between the ages of nine and twelve months it reached 26.6 per cent. The liability to contract tuberculosis is thus shown to increase from the first day of life. Experimental pathology has shown that the period of incubation after direct exposure to virulent bacilli is about two or three months; this being the interval between the date of the infection of the animal and the appearance of macroscopic lesions in the lung.

No cases occurring in the first three months of life, it is evident that the nursling becomes tubercular through infection and not by inheritance.

As examples, Huebner points to instances, well authenticated, of nurslings having been infected by a tuberculous midwife, phthisical nurses, etc., etc.

He quotes Kuess as having shown anatomically that the most frequent seat of primary tuberculous lesions in infancy and childhood is the bronchial glands, the infection occurring through inhalation, and appearing identical with inhalation-tuberculosis in animal experiments. From a small, easily overlooked focus in a bronchus, the bronchial glands become thus infected.

The author considers the relationship of tuberculosis to scrofulous glands by no means clear, but he nevertheless is certain of their identity, having, with the exception of only one single case, never failed to obtain a tuberculin reaction in simple scrofula.

Nurslings and infants are greatly exposed to infection from recognized and marked cases of tuberculosis in their elders. People who have apparently recovered from the early stages of consumption he considers especially dangerous in this respect.

As an illustration he cites the case of a colleague, aged 44 years, who, believing himself cured of phthisis, returned to his practice He still coughed a little and in his sputum bacilli were occasionally found. During this period his seven year old boy died of tuberculosis of the lungs, intestines and brain. The disease began as an amygdalitis with swelling of the cervical glands. One year later the father died of pneumonia, consecutive to influenza. At the autopsy a small cavity was found in the apex of one lung. Aside from this lesion the pulmonary tissues were healthy.

As there are many forms of exposure possible from which infection may result, the prophylaxis of tuberculosis in early childhood is especially full of details and imposes a painful degree of restraint upon the parents.

Since the numerous precautions can, as a rule, be carried out only in a defective manner, the only rational course to pursue is complete segregation of the child from its infected relatives. Every one to whose contact the child is to be exposed, whether nurse, governess, playmate, etc., must be carefully investigated for evidence of transmissible tuberculosis. No precaution need, however, be exercised with individuals who have non-suppurating lesions of bones, joints or glands. On the other hand, all discharging lesions, fistulae, lupus and the like are to be regarded as dangerous. Simple scrofula, so-called, conjunctivitis, coryza, otitis, eczema, etc., may be pronounced harmless if no bacilli can be found in the discharges.

The child's food should be submitted to the same strict surveillance, milk and butter requiring especial care in determining their fitness for the dietary. Very young infants have very little natural resisting power against tuberculosis. Thus Huebner saw a healthy child of sound parentage quickly succumb to tubercular meningitis after a limited exposure to a phthisical adult.

In the second year of life some degree of immunity appears to develop.

Continuing his statistics of tuberculosis at various ages, the author states that in the second year of life he found 14.2 per cent., in the third 13.4 per cent., fourth year 11.1 per cent., and so on in a descending scale until the tenth year, when the percentage had decreased to 5 per cent. It appears, therefore, that the greater morbidity from tuberculosis (over 26 per cent.) occurs in the fourth quarter of the first year.

The increasing degree of immunity which attains with advancing age may be illustrated in another way by the results obtained by Briault and Frenkel in autopsies. These observers examined the cadavers of eighty-three individuals who had died of non-tuberculous diseases and found healed tubercular foci in 80 per cent., which means that four-fifths of the patients admitted into the Lyons hospitals have had sufficient vitality or immunity to resist the action of Koch's bacillus after it had once obtained a foothold.

In answer to the question as to available methods and means capable of increasing the resisting powers of the organism against the disease, most authors claim that the resistance of the individual is much weakened by tuberculous ascendants. A physician of Kristianstad, seeking to throw some light on this point, examined 1,642 school children, among whom were 384 who had tubercular parentage. These children were found on an average 5 centimetres less in stature and 7 kilos less in weight.

Resistance to tuberculosis is claimed to be lowered through the occurrence of most of the infectious diseases, measles, scarlatina, whooping-cough, hereditary syphilis, etc., and also by certain defects in the action of the heart, as well as by bad or insufficient nourishment.

To increase the child's resistance by active prophylactic measures, Huebner points to good food as one of the first requisites, being even more imperative in infants than in adults. He gives credit to Rubner for the great advances made in the dietetics of infancy during the past ten years, enabling us to now know exactly what food is required by the child at any age. If, however, the young patient has no appetite, the problem of nourishment becomes vastly more difficult of solution, and variation in the diet becomes then our main resource.

An exclusively albuminous diet will not necessarily fortify the patient, because, by the excessive demands upon the digestive organs under their exclusive use, deleterious waste products are likely to be formed.

The law of isodynamics in diet has taught us that albuminoids, fats and sugars may largely replace one another.

The author recognizes assistance from newer methods of alimentary therapeutics, and from the progress which is being made in the preparation of artificial albuminoids, etc.

Equally important, Huebner considers hydrotherapeutic measures, and salt baths are particularly advised. The need of system and discrimination, however, is imperative; otherwise their application may produce the opposite of the result sought. With delicate children we must begin with tepid baths, gradually lowering the temperature of the water. The reaction of the skin must be the guide in their application.

Popular free baths for the poorer classes are recommended as a valuable factor in the crusade against tuberculosis. Next to the care of the skin, which should include cleanliness as well as hardening, come the care of the mouth and throat, these cavities constituting a sort of vestibule for the lungs; all such deleterious conditions as carious teeth, diseased tonsils, etc., ought to be remedied.

To insure pure air and respiratory gymnastics, the children of the poor should be provided with abundant park room in their own residence quarters of the large cities.

When children arrive at the school age new problems arise. The "Vacation colony" is one of the institutions which is coming into use to offset some of the unfavorable conditions which are inseparable from school attendance.

For children actually infected, the special seaside and mountain sanitariae now in operation act prophylactically toward the community at large, by segregating a large number of infected children, who themselves are thereby enabled to recover their natural vigor. This movement has, however, not been in operation sufficiently long to permit of a statement of its exact value. The statistics published by Dr. C. Scheperbon are here appended. His material consisted of 815 scrofulous children whose state of health was followed for eight or ten years after leaving the Maritime hospital. Of this number 60 per cent. were cured, 21 per cent. were still scrofulous, 19 per cent. had died. In the absence of control statistics we are of course unable to say whether or not these results are strikingly good or indifferent.

The author points out the necessity of strengthening the heart of these candidates for tuberculosis by the employment of measures recommended by him which all act as cardiac roborants, the pale skin, the lassitude expressed by the eye and features, the cold hands and feet, all showing a feeble circulation.

PRIMARY TUBERCULOSIS OF THE PROSTATE.

Kapsammer (Wiener Klin. Wochenschr. October 19, 1899) states that despite the classic description of this affection by Marwedel in 1892 there are still many gaps in our knowledge of the subject.

After a careful presentation of three cases, the author's comments are in part as follows: The relatively small number of cases of primary prostatic tuberculosis will be still further reduced by anatomical studies, as at present it is often impossible, without the co-operation of both clinician and pathologist, to determine in uro-genital tuberculosis whether the process began in the prostate or one of the adjacent organs.

The clinical symptoms exhibit great variability; chief among them are a sense of weight in the perineum, impediments to micturition and defacation, painful ejaculation of semen, which is often bloody, and demonstration of tubercle bacilli in the prostatic secretion. The urine may dribble when tuberculous infiltration of the internal vesical sphincter has occurred. According to Marwedel, at least one-third of the cases exhibit no symptoms whatever.

Prostatic tuberculosis may in reality be secondary to a remote focus, a primary osseous lesion for example, and it is also easy for a primary focus in the rectum to extend to the prostate along the venous plexuses.

These modes of extension show that the greatest care must be exercised before making a diagnosis of a primary focus in the prostate.

In its primary involvement it may be claimed that the germs have been implanted there during the foetal life; more probable is the theory that the bacillus, like particles of coal dust, are taken into the lungs, thence into the lymphatics, and finally entering the blood stream, from which they are deposited in the prostate or elsewhere, according to local conditions. Such localizations have been traced to a cheesy bronchial gland.

Some of the most distinguished pathologists maintain that prostatic tuberculosis can be acquired during coition with women suffering from tuberculosis of the internal genital organs, and a number of such probable cases are upon record. It is, however, not easy to determine how the bacillus reached the prostate gland under such circumstances. Kapsammer is inclined to believe that in prostatic infection from coitus this gland must have been infected secondarily from a primary focus somewhere in the penis.

In 1891 Englisch gave an account of tuberculous affections of the urethra and periurethral tissues, and dwelt upon their relationship to gonorrhoea. Patients with tuberculous urethrites, etc., often suffer from a discharge after coitus which is not gonorrhoea. In these cases Cowper's glands may become infected, a tuberculous abscess may form and discharge into the rectum, leaving a tuberculous anal fistula. The same urethral condition may give rise to tuberculosis of the prostate, which then appears to be, but really is not, primary.

Tuberculous prostatic disease can terminate in recovery through calcification. If suppuration occurs, the pus discharges in one of several directions and miliary tuberculosis may develop. Steinthal has reported a number of such cases.

These abscesses have been known to open up complete communication between rectum and urethra, so that gas is able to pass from the former into the latter.

With such an occurrence the ability to copulate may be preserved, but the semen is ejaculated into the rectum. Whenever the existence of a tuberculous abscess is suspected, a perineal incision ought to be made in season to avert these accidents.

In the treatment Kapsammer appears to have obtained benefit from the use of guaiacol. Of the iodoform emulsion, more authorities report adversely than favorably. Lancereaux found that an injection of tuberculin caused many bacilli to appear in the urine; the general condition, however, became worse, as is usual in all cases when the disease has advanced to the suppurative stage.

PRIMARY TUBERCULOSIS OF MUSCULAR TISSUE.

Lejars (Revue de la Tuberculose, October, 1899) states that within the past decade many instances of tuberculosis of the muscles have been reported, and that this statement is even true of primary tuberculous lesions. In the removal of these specific deposits it has often been necessary to resect large areas of muscle. The author adds the following case to the recorded material:

Patient male, aged 36 years. No tubercular inheritance nor history of antecedent disease or evidence of past scrofula. Examination of the various organs negative. About eight months before admission his left leg swelled. Fever, pain, discoloration of skin, were all absent; his leg, however, troubled him in walking. Another physician diagnosed deep varicose veins. Three months later pains appeared, becoming gradually worse, lancinating and radiating through the entire limb.

Within a short time small multiple nodules were felt along the front of the knee, increasing in size at a rather rapid rate. The skin at the outer lower aspect of the thigh became of a reddish brown. By palpation a great many small nodules could be felt over a space of five or six fingers' breadth above the knee. They were hard, round or oval, varied in size from a pea to a walnut, and were not adherent to the skin. One tumor, however, was much larger than the rest and appeared to have softened. The inguinal glands were not enlarged. The limb had become considerably emaciated. It was evident that the lower third of the quadriceps extensor was infiltrated with nodules, which Lejars readily diagnosed as muscular tuberculosis and proceeded at once to extirpation. An exploratory incision was made and those portions of the Vasti, which are situated to the outer and inner side of the tendon of the quadriceps were found to be infiltrated with hard and soft nodules, one large one being seated in the tendon itself: Extirpation was carried out, and as a rule some of the surrounding muscular tissue was removed with the tumors. The patient made a prompt recovery, but was afterward lost sight of. An exhaustive histological study of the nodules, undertaken by Dr. Pelliet, confirmed the diagnosis. Tubercle bacilli were also found.

The author makes no further mention of the original trouble of the leg below the knee. The inference is that it was due to the infiltration of the vastus internus, the largest and evidently the oldest of the deposits being seated in this muscle, in which locality it may have compressed the femoral vein.

According to the author, the lower third of the quadriceps is a favorite seat for the development of muscular tuberculosis.

BACTERIOLOGICAL STUDIES OF THE BLOOD IN PHTHISIS.

Schroeder and Nagelsbach (Muench. Med. Wochenschr. October 17, 1899) refer to the recent claim originating in Prof. Leyden's clinic, that whenever Ehrlich's diazo reaction is present to a marked degree in the urine of patients suffering from phthisis, it will be found that in the majority of such, bacteria are present in the blood.

The present authors studied eight cases of phthisis with diazo reaction. Blood was taken from the superficial veins of the arm and distributed in a number of tubes of sterilized bouillon for culture purposes, and separate microscopical studies of the blood were also made.

All the patients had severe hectic fever, but despite the presence of the diazo reaction, all of the eight cases failed to exhibit bacteria in the blood.

This subject, like the kindred one of the occurrence of pathogenic bacteria in the blood of consumptives with apparent sepsis, appears destined to be involved in contradictory findings. While pathogenic cocci are, as a rule, absent in the blood of phthisical subjects, there are occasional and well attested cases in which they have been found, and the same occasional association may occur when the diazo reaction is found.

From their investigations the authors conclude:

1st. That Ehrlich's diazo reaction in the urine of phthisical patients is a bad prognostic sign. In some cases it strengthens but can never replace the clinical prognosis, and it may therefore be safely dispensed with in practice. It has a certain value as a forerunner of death.

2d. Any necessary association between the diazo reaction and bacteria in the blood cannot be demonstrated in consumptives.

3d. Bacteria, especially of the pyogenic forms, may appear in the blood as if by accidental overflow in the struggle for life or death, but have then no direct connection with the presence of hectic fever.

The article by Michaelis and Meyer to which the authors refer and upon whose claims they have thus reported adversely, is published in the Charite Annalen (Berlin) for 1897, and is entitled, "Bacterien-Befunde im Blute von Phthisikern." It is based upon the examination of the blood in ten cases in which the diazo reaction was present, with the following results: Case I—Staphylo-cocci. Case II—The same. Case III—Diplo and Staphylo-cocci. Cases IV, V, VI—Staphylo-cocci. Case VII—Negative. Case VIII—Strepto-cocci. Case IX—Diplo-cocci, small, staining by Gram's method. Clinically, all the patients appeared to have advanced tuberculosis, being in the third or late second stage.

It is evident that the alleged presence of bacteria in the blood of consumptives with diazo reaction had no reference in the minds of the authors to Koch's bacillus, the presence of which in the blood could hardly occur save in acute general tuberculosis; but proof was sought that the diazo reaction stood in some connection with the question of hectic fever, and with the larger subject of "mixed infection"

Since it is generally accepted that hectic fever is due to mixed infection by pyogenic bacteria in the blood, the constant association of the diazo reaction with such bacteriological findings would not only have thrown some light on the meaning of this reaction, but would have added something to our diagnostic resources, to our knowledge of hectic fever and of therapeutic indications. It is to be hoped that the original reporters will repeat their first experiments.

(The diazo reaction has been studied in the laboratory of the Winyah Sanitarium for a number of months past, especially as to its prognostic and therapeutic indications.

Thus far it has been found present in six cases, five being rather advanced cases of phthisis, and one a case of acute miliary tuberculosis. In all the reaction was well marked. One of the phthisical cases was returned home on account of the otherwise unfavorable prognosis. In the other four phthisical cases, the reaction disappeared under the free drinking of hot water before meals, which materially increased the daily, but previously not deficient, quantity of urine. Coinciding with this the reaction disappeared, and the general improvement became well marked and continues at this time.

In the case of acute miliary tuberculosis the reaction also disappeared under the same treatment.

These limited observations allow us to hope that the diazo reaction has not so uniformly the evil prognostic significance attached to it, by the authors above mentioned, but that its recognition is of value clinically, indicating deficient elimination of waste products through the kidneys.—Editor.)

TUBERCULOSIS OF THE PHARYNGEAL TONSIL.

The last number of the Journal of Tuberculosis contained a resume of a study of this subject by Piffl. We here present another of an equally elaborate article upon the same subject by Lewin (Archiv fuer Laryngologie and Rhinologie, 1899, IX. Heft 3), who has done his work under the direction of Prof. Brieger of Breslau.

Only recently has it been fully understood that a hyperplastic pharyngeal tonsil, although clinically appearing the same, may represent different anatomo-pathological processes; for instance, the formation of a tumor may in the beginning resemble and be clinically indistinguishable from ordinary hyperplasia, similarly as we find in lymphoma, which may have a tuberculous, leucaemic or one of several other pathological substrata.

Lewin gives credit to Lermoyez for having been the first to demonstrate that hyperplasia of the pharyngeal tonsil may in certain cases represent a latent tubercular focus in an otherwise perfectly healthy individual.

That many investigators have not been able to confirm this may be an argument for the infrequency of the condition, or may be due to lack of technical skill, Lermoyez having repeated his earlier experiments with positive results.

Granted that in certain cases adenoids may represent a tuberculosis, are we justified in believing that the lesion is a primary localization?

If this structure is often attacked primarily by Koch's bacillus, we ought to find a corresponding percentage of specific lesions in miscellaneous autopsies, and in the clinical material of medical practice; providing that all individuals examined have adenoids, and are free from tuberculosis in other organs.

The first group studied by Lewin consisted of 150 cases of hyperplasia of the pharyngeal tonsil, taken at random. The patients were investigated with regard to heredity and general condition. The suspected tissues were examined histologically, bacteriologically and in experiments upon animals. Since Lewin has completed his own studies, other investigators have examined fifty additional cases of adenoids from Brieger's clinic, making a total of 200.

In nine of this total number the pharyngeal tonsil was found tuberculous, but in four of the cases tuberculosis of other organs was also present. The remaining five appeared to be examples of a primary affection, although it was possible that two of these had incipient pulmonary disease, rendering it difficult to determine which localization was the earlier.

Lewin's opinion is that tuberculosis of the pharyngeal tonsil is far more likely to be associated with tubercles elsewhere than that it is an isolated localization. As a corollary, therefore, the discovery that adenoids are tubercular in any given case should cause us to suspect the presence of latent foci of the disease in other parts of the body. As a matter of fact, Lewin found that children with Lichen scrofulosorum, lupus and scrofulous glands almost invariably suffered from adenoids. However, all attempts to discover tubercles in these adenoids were practically failures. It is evidently one thing to see in adenoids a stigma of lymphatism or the scrofulous diathesis and quite another to find actual infection of the tissues in question; and herein we have another evidence of the clinical disparity between scrofula and tuberculosis.

In this connection it may be well to mention that several observers have claimed lupus of the face to be very frequently associated with a high arched palate and deflected nasal septum. These two malformations have often been ascribed to the agency of adenoids in interfering with the development of the nose. Those who have noted this association might ask whether or not the lupus has had its origin from a primary adenoid focus.

The diagnosis of tuberculosis of the pharyngeal tonsil by histological methods is attended with difficulties. In lymphoid tissue the presence of a foreign body may give rise to so-called pseudo-tubercles, and in which giant cells may also be found. By the exercise of due caution, however, the correct diagnosis may usually be made.

The demonstration of Koch's bacillus in these foci appears to be less difficult to some investigators than to others, and the majority, including some of the best authorities, have failed.

This failure is held to be due to the fact that the bacilli are only very sparingly present. Lewin himself seems to have had no trouble in finding the bacillus almost invariably, but only in very limited numbers.

For his animal experiments Lewin used twenty adenoids and introduced portions of them into the peritoneal cavity of guinea pigs. He obtained but one positive result; this was, however, the more valuable as the tissue came from a child in apparently perfect health.

A fourth method of investigating the nature of these cases is furnished by the tuberculin test, a significant fact being that a general reaction may be produced with great frequency in children having adenoids. Unfortunately, however, this general reaction does not show that the latent tuberculosis which is thereby revealed is seated in the pharyngeal tonsil, because children are equally subject to other localizations of the disease. The local reaction may also be fallacious, and, unless the adenoid tissue undergoes a marked degree of swelling, we cannot accept the result as definite.

Having described in detail his nine positive results in the living, the author appends the results obtained by others. The combined figures aggregate a total of 905 cases investigated, of which forty-five cases, or about 5 per cent., were proved to be tubercular.

Lewin also examined the cadavers of twenty-five tuberculous subjects, with eight positive results. Six of these were examples of isolated localization and the other two were associated with tuberculosis of the palatal tonsils.

It appears to be such a simple matter for the pharyngeal tonsil to be infected from the lung that it would be unwise to claim the likelihood of the converse, that the lungs are infected from the tonsil.

The author seeks also to determine the possible relationship of latent tuberculosis in adenoids to infection of neighboring parts, such as the nasal cavities, middle ear, vertebral column, meninges and lymph-gangla, but his data appear inadequate for definite conclusions.

On the whole, Lewin arrives at the opinion that tuberculosis plays a relatively unimportant role in the pathology of the pharyngeal tonsil, and that only about 5 per cent. of adenoids are tubercular.

SPONTANEOUS CURE OF LARYNGEAL TUBERCULOUS ULCERS.

Eisenbarth (Deutsches Archiv fuer Klin. Med. LXV., Nos. 1-2) states that the incurability of tuberculosis, long a dogma in science, is becoming more and more modified by new clinical evidence. We now know that the lesser tuberculous affections may end in resolution, and that even lung and bowel lesions of considerable extent are able to heal. From the purely scientific standpoint there can be no doubt of the essential curability of the disease.

At present we are still far from knowing the percentage of recoveries from tuberculosis of individual organs, and the author limits his paper to a discussion of the frequency of recovery from tubercular laryngitis, especially in its ulcerous form. It has been estimated that the larynx is affected in about 14 per cent. of cases of tuberculosis in which autopsies are made (Willigk). Heinze, however, in an equally large autopsy material, records 30 per cent.

Of laryngeal tuberculosis it is well known that children are almost immune to this localization, at least so far as ulcerated forms are concerned. There is a very wide discrepancy in the views of authorities as to how the bacillus reaches the larynx, but the various hypotheses need not be repeated here.

In regard to the curability of such laryngeal lesions, Orth claimed (1887) that they might undergo "partial resolution." He did not at that time know of a single case of complete cure. Other pathologists have denied their curability in toto.

Eminent laryngologists, however, began to maintain as early as the sixties (Tuerk, Tobold) that both temporary and permanent cures occasionally occurred. In 1886 Herzog was able to prove the correctness of these views upon anatomo-pathological grounds, showing that both partial and complete cicatrization could occur. Schroetter (1881) states that recoveries are frequent. Careful supervision of cases extending over long periods of time having shown, not only that recoveries occur, but the precise circumstances under which they come about. There is no doubt that the discovery of Koch's bacillus has been of much assistance in the demonstration of this fact. Clar, in 1896, saw repeatedly the healing of laryngeal ulcers under general regimen (mik diet, hydrotherapy, etc.). Rosenberg reported a recovery in 1888 without any local treatment having been employed; others have seen laryngeal ulcers heal while pulmonary symptoms were rapidly becoming worse. A number of like cases are upon record.

The author adds a new case to the recorded material of spontaneous cures. The complete recovery as far as laryngeal tuberculosis is concerned was attested by the results of autopsy. Throughout the history of the case no direct treatment was applied to the ulcers.

The lesson to be derived from cases like the present is a very obvious one. If lesions of the type of tuberculous laryngeal ulcers, generally looked upon as essentially malignant, can heal spontaneously, very much may be done by skillful, specific treatment. The author makes no mention of the numerous recorded cases cured by local and specific treatment, but Schmidt, who was one of the first to behold spontaneous cures, is one of the most ardent advocates of active interference. In his well-known text book (Krankheiten der oberen Luftwege, 1898) he speaks very optimistically of the curability of these cases, although he believes in heroic surgical treatment when indicated (extirpation with cutting forceps, laryngofission, etc.), while in light cases he insists upon the unmistakable benefit conferred by small doses of tuberculin, and refers to additional cases in which he obtained complete cures.

THIOCOL AS A REMEDY IN PHTHISIS.

Schnirer of Vienna (La Presse Medicale, October 4, 1899) reports favorably upon the efficacy of Thiocol in phthisis.

He hopes that the new sanatorium movement will not offset the laudable attempt to find remedies which are specific or quasi-specific in their administration against tuberculosis. The author regards the efficacy of creosote in tuberculosis as a well attested fact, and calls attention to numerous laboratory experiments, notably of those by Schueller and Guttman, which, he says, prove to a certainty that creosote exhibited in various ways is able to neutralize or abort "laboratory phthisis."

If by "laboratory phthisis" the author means a culture of tubercle bacilli, as he must, since neither creosote or any other germicide has ever been successfully employed in the animal experiment, the certainty of which he speaks is by no means peculiar to creosote, and even the simple presence of metallic silver inhibits the growth of the bacillus of tuberculosis, a fact which was demonstrated a number of years ago by Dr. Dunn in the laboratory of the Winyah Sanitarium, and many other apparently unimportant details are known to have a like effect upon the artificial culture.

In dissenting from the views that creosote is only a stomachic, and therefore of only indirect benefit, he points to good clinical results from its hypodermic and rectal administration, and to the fact that it is as likely to upset the digestive organs as to act in a favorable way upon them.

Citing Maragliano as believing that creosote prevents mixed infection in phthisis, and thereby protects the patient against its dangers,. he sees in this view another way of confirming its action of reinforcing the resisting power of the organism by modifying the soil in a manner, that it becomes less adapted to the growth of bacteria, an action which is suggested by its name (flesh preserver) and by its economic uses.

Whatever the rationale of its action, the drug has proved in Schnirer's hands the best of the autitubercular remedies. In ten years he has treated over 400 consumptives with it, and he echoes the opinions of other of its enthusiastic advocates.

It being conceded that creosote is of value in phthisis, the author admits it to be a caustic, toxic and disagreeable substance, and that these qualities greatly impair its usefulness. Hence the great efforts put forth of late years to find a substitute derivative of creosote, which should be free from the drawbacks of the latter. In 1897 Schnirer came upon the substance Thiocol, which he now believes to be the harmless and efficacious substitute for creosote and all other of its derivatives.

Thiocol is an ortho-sulfo-guaiacolate of potassium. It contains 52 per cent. of guaiacol, is a white, inodorous powder, freely soluble in water. It is not toxic to animals; on the contrary, they are said to thrive upon its use and to gain in weight.

There is, however, an isomeric substance, para-sulfo-guaiacolate of potassium, which is poisonous and which may readily be mistaken for Thiocol. All samples of the latter should therefore be carefully tested before use. A watery solution of Thiocol gives a violet coloration with perchloride of iron; the future addition of ammonia changes the color to yellowish white. The poisonous isomer gives a claret colored hue with the iron reagent.

Thiocol, the author says, does not seem to be eliminated very freely by the kidneys, suggesting the likelihood that it is largely retained in the tissues.

His clinical experience with this drug during the last two years has been with thirty consumptive workingmen. Other treatment was practically limited to a certain amount of rest with exposure to out-of-door air. The effects of this enforced idleness he does not believe to have been altogether beneficial, as the income of the patient was thereby cut off, resulting in inconvenience, anxiety, etc.

The author believes that Thiocol ought to be entitled to most of the credit for the improvement he has observed. The drug was given in doses of 3 to 6 grams per day. At the end of the period of observation two-thirds of the patients had undergone notable improvement. Every degree of the disease was represented, but the author does not advise that the drug should be used in very grave cases until it can be shown that it is efficacious in mild and beginning instances of the disease.

Hence most of the case histories which he relates are examples of the milder forms, which appear to have been improved. As should be the case, he claims good results in scrofulosis, osseous tuberculosis, etc., although creosote has heretofore not been epecially vaunted in their treatment. A true anti-tubercular remedy ought to be applicable to all forms of tuberculosis, and the author advises the surgeon to make use of Thiocol in the various surgical forms, the remedy being a harmless one.

TREATMENT OF TUBERCULOSIS OF THE TESTICLE.

Petit, the editor of the "Revue de la Tuberculose," gives the following summary of the results of a recent discussion of this subject before the Paris Surgical Society, in the October number of his journal:

The greatest uncertainty still attends the question of the operative interference in testicular tuberculosis. Ablation of the lesions within close limits may arrest the progress of one case and accelerate that of another; while on the other hand a cure may follow currettage, or simple incision and disinfection, or even purely medical treatment. Some operators believe in routine castration. We only know that there is no form of interference which will guarantee a cure, and that the prognosis cannot be too carefully made.

The best that can be done is to observe the rules for guidance as laid down by the late Verneuil. In a local tubercular affection with still intact skin and which has not suppurated, Verneuil advised non-interference; while in an open suppurating, fistulous or fungating form he applied the actual cautery. Many of his pupils still carry out these two maxims, and the results from this method compare favorably, in the long run, with those obtained by resection, castration, etc.

Only in an encapsulated tuberculosis is one justified in any sort of radical procedure.

TUBERCULOSIS AND LIFE INSURANCE.

At the recent meeting of the First International Congress of Physicians of Life Insurance Companies at Brussels (September, 1899) there was a discussion upon the question of the insurability of tuberculous subjects (La Presse Med. Belge, October 15, 1899).

The paper on the subject was read by Dr. Meyer of Metz, according to whose expressed views the examiner should reject the following classes of applicants:

1st. Those who have, or have ever had, a presumably tuberculous coxalgia, otitis, osseous caries.

2d. Those of tuberculous stock who have ever had a pleurisy, hemoptysis, chronic bronchitis, scrofulous lesion, spinal deviations.

3d. Those who (independent of ancestry) have ever had any form of pulmonary bronchial or pleural affection of a tuberculous character.

4th. Those dyspeptics of tuberculous stock who are refractory to all treatment.

5th. Those of tuberculous stock who live under conditions which invite tuberculosis and who are notably below normal in weight and in chest measure.

6th. Those of tuberculous stock below the age of 35 (or 40) who have not a vigorous constitution.

7th. Those who may be termed, in the widest sense of the word, fit candidates for tuberculosis.

On the other hand, a very robust and vigorous individual may be accepted, even if he comes of tuberculous stock.

Discussion: Salomonsen would be guided largely by the weight in estimating the likelihood of an applicant's developing tuberculosis.

Weill-Mantou (Paris) would reject for traumatic hemoptysis, because this condition so often leads to pulmonary tuberculosis. Anal fistula ought invariably to reject the applicant.

Moritz of St. Petersburg would postpone for fistula in ano and past pleurisy.

Manillon of Brussels would be guided rather by the entire family history, and special diseased states would be considered by him from a subordinate point of view.

The statements of the last speaker are more in accord with the views of American actuaries. A good family history, good weight, with freedom from suspicious disease for ten years, would lead to the acceptance of risks, despite a personal history of hemoptysis or numerous other conditions presumably of tuberculous nature, even including spondylitis. As the mortality from tuberculosis is becoming smaller throughout civilized countries, it is difficult to understand the increased strictness of the rulings of Dr. Meyer, unless the latter are an outgrowth of the compulsory and co-operative factors which obtain so extensively in certain parts of the continent.

TREATMENT OF TUBERCULOSIS WITH KOCH'S TUBERCULIN.

In his paper before the Berlin Congress, Prof. Petruschky, of Danzig, points out that if our battle with tuberculosis is to be effective, and if in its treatment we desire to attain success, we must bring to our resources all means which are available to medical science, and a prominent one of these is undoubtedly tuberculin. After nine years of trial of the remedy, it is possible to arrive at a conclusion as to its value. Only a comparatively small number of physicians have used and studied this remedy continually during this time, but it is significant that these have arrived at a favorable judgment of its value.

Although a large majority oppose their conclusions, this opposition has its origin in the disappointments of the first few months of its therapeutic application, and represents the echo of the sayings and writings of that period. The greatest number of this opposing majority have had little or no practical experience at all with tuberculin, believing themselves called upon to urbi et orbi announce their fatal judgment.

Such a majority should have no influence in scientific medicine, in which we must weigh the value of, rather than to count the number of, voices which appear for or against a proposition under consideration.

Tuberculosis is a disease which cannot be healed in a few weeks or months, and the good results which occur under any short period of treatment are usually not due to the removal and healing of the tubercular process, on the contrary, they are the effect of removal of complications, improvement of general condition, etc.

For an actual cure much more time is necessary, and with tuberculin several years are required, during which periods of active treatment should alternate with periods of rest.

The author has used tuberculin since its first introduction, with entirely satisfactory results; he has never observed any unfavorable effect, and this he attributes to the care exercised to avoid acute and chronic intoxication with it. Neither has he observed dissemination of the tubercular process, but his anatomical post mortem studies have shown the observed recent eruptions of tubercles to stand in relation to acute inflammatory processes from secondary infections, when tuberculin had never been used in the preceding treatment, a fact which was not appreciated at the time when tuberculin was first introduced.

CHEMICAL LIGHT RAYS N THE TREATMENT OF LUPUS.

In Vol. I., No. 2, of this Journal we reported heretofore on Finsen's method of treating lupus, which is now described more fully in the British Medical Journal, September 30, 1899.

The method of acting upon the skin by concentrating chemical light rays obtained alike from the sun and from electric light has been known to specialists for several years, and a number of authors have contributed articles on its possibilities. The greater discovery of radiography seems to have obscured the method of Finsen so thoroughly that not a few readers erroneously understand the term "concentrated light" to refer to the X-rays. The article in the British Medical Journal is not only compendious, but is copiously illustrated, and it gives the subject presented not in a crude condition, but in a finished form.

Finsen conducts a sort of "light laboratory" at Copenhagen, in which the therapeutic properties of various rays are systematically studied. His method rests upon the truth of the three following propositions, which are readily demonstrated:

1st. The chemical light rays are bactericidal.

2d. The said rays are able to cause a dermatitis which is of the same nature as sunburn.

3d. The said rays are able to penetrate the skin.

Dr. Bie, Finsen's assistant, the author of the paper, states, that the bactericidal action of light in general has been abundantly studied. It appears to be evident that this property is derived from certain rays only, the remainder being inert. The violet and ultra-violet rays are by far the most active, while the red, yellow and green are useless.

The advance made by Finsen is due to his method of concentrating the chemical rays. Whereas unconcentrated light requires hours to kill plate cultures of bacilli, the concentrated rays destroy them in a few seconds.

Beside their bactericidal action the chemical rays have a definite physiological or pathological action upon the skin, in causing so-called "sunburn."

Widmark's familiar experiment of passing the light through glass, which absorbs the ultra-violet rays, shows that these latter are chemical, because under circumstances which excludes them the skin is never sunburned. As yet we cannot determine whether the chemical action co-operates in the production of the therapeutic results.

The power of the chemical rays to penetrate the skin is readily shown by the fact that silver chloride placed in glass tubes beneath the skin of animals is readily blackened by the rays, and to Dr. Bie it is self-evident that the Finsen treatment applied to a disease like lupus must be eminently rational.

Sunlight is used in summer, electric arc lights of 50 to 80 amperes in winter and on dark days. The light must not only be concentrated but cooled as well; otherwise the skin would be actually burned by the chemical rays. Finsen uses for sunlight a plano-convex lens 20 to 40 centimetres in diameter; between them is a liquid lens, so-called, consisting of a solution of copper sulphate. The water absorbs the hot ultra-red rays, while the blue color excludes some of the red and yellow rays. The ultra-violet, violet and blue rays pass through the lenses almost unchanged.

The electric light is focused through a system of quartz lenses, arranged in brass tubes like the lenses of a telescope; the divergent rays of the arc light are rendered parallel by the first lenses and are then made convergent by the second lenses. A liquid lens for cooling is placed between the two proximal lenses; it consists merely of distilled water which does not require to be colored blue, as the case with sunlight.

As thus modified, however, both kinds of light are still too warm. A little apparatus consisting of quartz lenses, which are further cooled by a short investing coil through which cold water is allowed to circulate, is held in close apposition to the skin by an elastic band.

An area of skin about 1.5 centimetres in diameter is treated for about one hour per day.

The skin disease which has been most extensively treated as a test of the method is lupus vulgaris. In mild cases the light alone is used, but in severe types pyrogallic acid ointment is first applied to give greater penetrability to the skin.

It is known thus far that lupus of the skin and of the accessible mucosae is curable by this method. The worst cases have naturally been sent by physicians to test the method. In all 350 cases have been treated, and in but five a greater or less degree of benefit has resulted. In these five exceptional cases the lupus was either highly acute in type, appearing more rapidly than it could be cured; or the process extended too deeply beneath the surface to be amenable to the penetration of the light. In the 345 cases which responded to the treatment the good results were unmistakable. Some days are required before the benefit of the treatment is apparent, but after it has once set in it is progressive.

As to the degree of benefit received, some of the published photographs tell the story better than words, and they indicate that the results attained in the severer forms of lupus exceed those from any other method. This is also true of the cosmetic effect, which is accounted for by the fact that the light itself does not destroy tissue. The light may be applied for an indefinite period after all evidences of lupus have disappeared; and it is its continued use thereafter that contributes to the apparent permanency of the results.

Bie does not deny, however, that a second course of treatment has been necessary in a number of cases. This supplementary treatment is doubtless inevitable in securing a radical cure in the severer forms.

Some of the photographs show a number of patients undergoing treatment; both the patients and attendants (who appear to be holding the patients' heads steady under the light) have their eyes protected by goggles, and the position in which the patient receives treatment is, as a rule, nearly or quite horizontal.

EDITORIAL.

AN AMERICAN CONGRESS ON TUBERCULOSIS.

The following announcement of the Medico-Legal Society of New York has been given out:

"It has been decided by the management of the Medico-Legal Society to devote an extraordinary session to 'Studies on Tuberculosis, Its Management and Modern Treatment,' on the third Wednesday of February, 1900, at a regular meeting in this city, to open a full investigation and discussion of the whole subject, and to invite the leading American scientists and specialists to contribute papers and unite in the discussion of this subject and the most advanced and modern treatment of tuberculosis.

"The following questions have been decided upon to be submitted for this discussion:

"1st. Special hospitals and sanitariums, their construction and operation.

"2d. What are the most successful methods of treatment?

"3d. Individualization of certain forms of tuberculosis, its importance and necessity.

"4th. Is change of climate a necessity for successful treatment?

"5th. Should the use of anti-toxins in tuberculosis be condemned from a purely scientific point of view?

"It is proposed to announce, in the programme, the name of one or more experts who will submit a paper upon each of these questions.

"As a large number of the specialists are willing to take part at the opening meeting, after the dinner at the opening session at 7 p. m., on the third Wednesday, it is proposed to continue the Congress the next day, so as to make the discussion full and complete.

"It is proposed not to limit the titles of papers to those stated questions, in case an author desires to submit his views upon any other germane subject that he prefers.

"The great interest in this subject, on both sides of the Atlantic, which also has been given great prominence in the Paris Congress of 1900, will make the movement of great interest, not only for the profession, but also the general public. Members and others who are willing to take part are requested to immediately write to either member of the committee upon which of these questions they will submit their views prior to the 1st of February next, if possible, so that the same may be printed and submitted to the others who are to take part in advance of the meeting, as is the custom in foreign countries.

"The following committee has been named by the Medico-Legal Society to act as a committee of arrangements for this Congress, with full power; and the profession is desired to co-operate by contributing papers and taking part in the discussion, and to advise either member of the committee as early as possible.

Thomas Bassett Keyes, M. D., 98 State St., Chicago, Ill.
J. Mount Bleyer, M. D., 460 Madison Ave., New York.
Clark Bell, Esq., 39 Broadway, New York."

While this Congress will probably not compare in its scope and membership with that which met in Berlin last May, it is nevertheless the first step toward an effective crusade against tuberculosis in the United States, and by bringing the interested workers together it should, and no doubt will, result in an organized movement that in time will be of the greatest importance and benefit to the prevention and successful treatment of tuberculosis on this continent.

The limited time contemplated for this first meeting will probably admit of little more than a free exchange of views and the formulation of plans for the future, but if these will be sufficiently broad and comprehensive, and if there will be friendly and sincere co-operation by all, we have no doubt that America will soon take a leading position in practical and effective methods of dealing with the subject.

The importance of this gathering can scarcely be overestimated, and if we are not greatly mistaken in the attitude and earnestness of American students of tuberculosis, we may surely predict that the New York Medico-Legal Society will have occasion to be highly gratified with the response to their invitation, as well as with the outcome of their plans.

THE TUBERCLE BACILLUS AND ITS VARIETIES.

There are few organisms that have been more carefully studied and investigated as to their biology, morphology and pathogeny than the bacillus of tuberculosis.

Soon after its discovery by Professor Koch, it became evident that this bacillus, like others, presented varieties which, although standing very closely related, differed in some essentials from that which stands in causative relation to human tuberculosis.

The first evidence to this effect came from the observed discrepencies between Koch's published observations at the time he announced his discovery of the bacillus and those made thereafter in the Pasteur laboratory at Paris; the French author showing not only well marked biological, but also pathogenic differences, to a degree that from the standpoint of the French students Koch's claims appeared unfounded. It, however, soon transpired that the cultures with which the French authors obtained such difference in behavior had their origin from a pheasant, and with the subsequent studies of Koch, Maffucci, Ribbert and others the avian form of tuberculosis became recognized as one distinct and peculiar to itself.

The specific bacillus of leprosy, also at one time thought identical with the bacillus of Koch, portrayed marked differences upon closer study, and so it has been with several of other bacilli which, like the Smegma bacillus, had points of resemblance.

In the earlier periods of the study of Koch's bacillus it was thought that it had no existence in nature except as a parasite in the body of warm blooded animals; with the finding of a related bacillus in fish, causing a tuberculous process in their tissues, the scope of their distribution was further enlarged, but until recently it was thought to exist only as a parasite.

In the past few years bacilli of the same species with similar morphological characteristics have been discovered to exist as saprophytes, being found in manure, upon grass and hay, and if these observations are further confirmed, as is to be expected, the species of bacilli, with only a variety of which we are concerned in the production of tuberculosis, will be proven to have a much greater distribution than its earlier studies indicated.

At the present time we distinguish three pathogenic varieties, namely, those which are respectively causing characteristic tuberculous lesions in mammalia, in birds and in fish; in addition we have to recognize perhaps two non-pathogenic varieties, the Smegma bacillus and the common saprophytic form, which latter, as stated above, is apparently ubiquitous in nature, being found in manure, grass, earth, etc.

It would not be surprising if in the pathogenic forms finer distinctions will eventually be possible, and, from the point of clinical observation alone, it is likely that the bacillus found in lupus may represent a sub-variety of the mammalian form.

What the parent stock of the species which produces tubercles may be, from which the varieties and sub-varieties have been differentiated by adaptation to new conditions, is not yet shown, but the indication is that it is the saprophytic form.

In the avian form reversion to the mammalian type appears to have been accomplished by special laboratory culture and methods, by which they were made to adapt themselves to the differing conditions of lower temperatures, etc., at which they otherwise refuse to grow, and, as with other forms of life, the tendency is, as a rule, to reversion to the lower type, at least for many generations, until the adaptation to new or changed conditions is permanent and complete.

The demonstration of varieties of Koch's bacilli, as heretofore briefly reviewed, has, however, caused considerable alarm among both professional and lay minds; and the fear has been expressed, that with this evidence before us the prophylactic measures against the specific germ of tuberculosis in the human subject are defeated, that the aspect is a hopeless one, and any effort to limit and to destroy this germ is useless.

Such a view is, however, by no means justified; on the contrary, it is absolutely wrong.

As elsewhere in nature, fixed species and fixed varieties do not change, unless through change in environment, food and external conditions generally, and when such change is observed, it is gradual in proportion to the difference between the new and the old.

The greater, however, this difference is, the more difficult is the adaptation of accomplishment. When well marked it does not occur at all, except by progressive steps.

With the evidence before us, we are not at all concerned with the saprophytic form, which we may as well ignore, as we do other saprophytes in the bacterial world. That they will become so adopted that they can exist as pathogenic parasites and cause the formation of tubercles, thereby threatening the health and life of animals and of man, is out of question for all practical considerations.

The like is true of the piscine form which stands in causative relation to the tuberculosis of fishes, and the fact that adaptation has been possible of the avian variety, through special, extraordinary methods of laboratory procedures, to that which is pathogenic to animals, is for the present only of scientific interest, but entirely in conformity with the known laws of evolution, natural selection, adaptation, etc., by which living things have become differentiated and to which laws all living things conform.

If such an adaptation should occur unaided and in a natural course, the conditions must still be special, and even then the result would affect only that one animal or man in which it might occur. Such a possibility must be admitted both in the light of its artificial accomplishment and in that by which we distinguish the varieties spoken of, all of which have undoubtedly a common origin in a parent stock or type.

Neither the knowledge of varieties nor the recognition of the possibility of one variety becoming under exceptional conditions so changed that it is biologically, morphologically and pathologically identical with another, need cause us to look with dismay upon bacterial prophylaxis in tuberculosis.

The habitual pessimist may indulge his morbid fear in this manner, but with no more reason than the optimist would have, if he concluded and rejoiced that the bacillus of Koch will soon revert to a non-pathogenic form, because such a result has also been obtained by artificial methods of culture, or because non-pathogenic forms exist in nature.

Clinically and experimentally it is a well established fact that the infection of man occurs through man, and through the economic uses of products of the lower animals, chiefly from the dairy, but occasionally also through infected meat, when it is not sterilized by cooking, which obtains particularly with rare beef, smoked meats and sausages.

But the infections from meats are infrequent, when compared with those which occur from milk, and dwindle in their frequency almost into insignificance when contrasted with those which result from tuberculous discharges and excretions that have their origin in man himself.

With this knowledge the scope of our prophylactic efforts is well defined and understood. We can only attack the bacillus where we find it, and we certainly know where we must look for it.

The strictest cleanliness in the rooms and dwellings of tubercular patients, and especially in the disposition of their sputum and other discharges, together with active and increased efforts for limiting and stamping out the disease in cattle and swine, will do all that can be hoped for from bacterial prophylaxis, and though it may not stamp out the human scourge in thirty years, as one of our English colleagues predicts, yet it will undoubtedly lower the mortality rate perceptibly in the future, as it already has done in the past.

THE COMMERCIAL EXPLOITATION OF NEW REMEDIES.

The charge of unfounded or excessive claims regarding their therapeutic value, or even of their unscrupulous exploitation, appears quite frequently in the discussion of new remedies, especially of the so-called "laboratory products," which include the extracts of organs like the thyroid, blood serum of animals supposedly immunized against certain infectious diseases, and the products of pathogenic bacteria themselves. These laboratory products represent, as a rule, albumoses, about the chemistry of which little or nothing can be known, at any rate no physical or chemical examination is possible, the result of which would enable us, a priori, to form some conclusion of their probable therapeutic properties.

Requiring, as a rule, great skill and painstaking original investigation and laboratory experimentation by their discoverers, there is no doubt that in the latter's haste to secure credit for the original work involved, such remedies are frequently announced prematurely, before sufficient use, or entirely free from personal bias. It then happens that some of the supposed virtues are found less pronounced or perhaps altogether wanting, and the author's claims have to be modified by the more general use and experience of others.

The moment, however, that such general use is initiated a commercial factor must necessarily appear, unless the discoverer or originator should add to his preceding expenditures in laboratory costs and time, the cost of more extensive manufacture and of distribution, for periods of perhaps several years, and until his claims have been verified.

From such commercial distribution there is, however, small danger that much pecuniary gain will result to either the discoverer or to the first manufacturer, even if, as in diphtheritic serum, the remedy is eventually proven of great value, because, having been further demonstrated and confirmed, there are then plenty of manufacturers who undertake its production in competition with the first.

When such remedies with more or less clinical and experimental proofs are first given out, the originator and manufacturer both are as a rule fully convinced in their own minds, that the product is a valuable one, because its proving otherwise would not add to the author's reputation nor to the manufacturer's gains; on the contrary, their failure would prove a loss to both. In such an introduction we can see no unscrupulous exploitation by the producer; he brings his product before the profession in a legitimate way, with whatever claims and testimony as to its value have been evolved in the personal observation of its discoverer during its incubative stage.

The commonly recognized and rarely absent unconscious personal bias, by which the discoverer must necessarily desire to see success rather than failure, makes it indeed imperative that other less intensely interested observers should practically test the value of his new product, and so long as the manufacturer comes openly before the profession with what legitimate evidence he has, the procedure appears to us a perfectly honorable and ethical one in all respects.

If the claims seem reasonable, if the work with the evolvement of the remedy appears well done, and of which the profession is usually given opportunity to judge, they can try it or not as they may see fit, but the profession is in no more danger to be misled than with anything else that is new; such introduction being the usual one not only with "laboratory products," but with all other new remedies and drugs past and present, among which there are but few that have in all respects met the expectations which the first claims of their originators justified. It goes, however, without saying it, that but for such introduction and subsequent investigation by others all therapeutic progress would have been impossible.

The cupidity and questionable methods of some manufacturers are, however, quite another question, and, combined with shrewdness, they appear to have found ways and means to accomplish selfish ends by another and more profitable course, much less liable to detection or even to be questioned, and by which they succeed in palming off large quantities of unproved preparations.

They know full well that their own claims are subject to rigorous inspection, and are often taken with a large discount, simply because we know the liability of the originator "to see only the good in the apple of his own eye." But when such manufacturers have little or no confidence in their new remedy, or know it to be worthless, they resort to another method, and from which there is real danger to the profession, for it can only succeed through co-operation in our own professional ranks, not always in the low and mediocre, but also in high places, by certain members becoming the uncrupulous exploiter's tools and hirelings for various considerations.

Certificates attesting the value of worthless products are thus obtained and large fees are known to have been paid, up into the thousands of dollars, for a single certificate or recommendation.

The more common way, however, is to hire cheaper men to make reports of so and so many cases treated, with on the whole favorable results, and the more disinterested such a report appears the more valuable will it be considered as an advertising scheme.

With or without a definite cash consideration, these subsidized hirelings get all sorts of pecuniary aid, direct and indirect, from the vendors of the remedy. The latter is of course supplied free, and is charged over to the patient. If the report is to be read before a medical society at a distance, liberal expenses are paid for its presentation; the more valuable the manufacturer deems the report the greater number copies will he have printed and will flood the profession with them, sending them out with "the author's compliments," perhaps from the latter's own office, where the mailing is done at the manufacturer's expense.

The author receives thus free advertising all over the country, which often adds to his reputation, if he has one, or it brings him business from a distance, and, on the whole, it pays him very well, at least for a time.

These practices are difficult to unmask, and usually cause no suspicion whatever to the recipient of the reprint. On the contrary, he sees no connection between the manufacturer and the author, who may live at a distance and be in legitimate practice, perhaps connected with a medical college or public hospital, etc.

These nefarious methods are the real menace to legitimate progress, and, being known to exist, they have become a serious hindrance in many ways, so much so that for fear of being suspected of undue influence, many of the best and most honorable men in practice have grown most reluctant, and some of them almost if not entirely unwilling, to speak publicly or to write in comment of remedies which they themselves have proved to be really valuable and deserving of confidence.

A valuable remedy, however, especially if it is a recent addition to our resources, is not only entitled to proper recognition, but it is a duty to the profession as well as to humanity to accord whatever credit we find it to deserve; yet until some means can be found against fraudulent reports from apparently disinterested sources, there seems to be only one way to protect ourselves, and this is to take nothing for granted, from the reports of men who are not known to us personally for their love of their profession, for their ability, skill and integrity and established reputation in its practice, and beyond that we must settle the value of any new procedure or new remedy for ourselves.

THE JOURNAL OF TUBERCULOSIS.

With the beginning of the second volume of this Journal the editor would repeat what he said in the short introduction to the first volume, namely, that he hopes to make this publication a representative organ of American endeavor and progress in the prevention and treatment of tuberculosis.

Since the issue of the first number the Journal has been steadily increased to its present size and has met with a most gratifying reception, especially by the general practitioners throughout the country, and a number of subscriptions have also been received from abroad.

This generous support confirms the editor in his belief that a publication specially devoted to tuberculosis is desired by the profession, and that the original articles and reviews published have been considered as in line with and as complying with his first announcement.

Entering now upon the publication of the second volume, with a list of subscribers closely approximating four thousand, we hope to show our appreciation by earnest and increased endeavors toward its value and usefulness, and to this end we bespeak the aid of our readers, who are in a position to contribute to the original columns from their study and practical experiences in the prevention and treatment of tuberculosis, a subject which is and will continue to be one of the most vital questions before the medical profession, until it is finally solved to the benefit of all mankind.

THE LOOMIS SANITARIUM FIRE.

Although the administration building of the Loomis Sanitarium was totally destroyed by fire on October 14th, the work of the institution has gone on uninterruptedly, the casino building having been temporarily adapted to the purposes of administration. It is expected that a new administration building will be completed within a few months. None of the patients' cottages were at all injured by the fire.

SUPPLEMENT TO THE JOURNAL OF TUBERCULOSIS.

In this part the whole subject of Pulmonary Tuberculosis will be covered by a continued series of articles written by Dr. Karl von Ruck. Articles already in print will be revised, and republished, and others will be written new, appearing in the following order.

Article I.—The cause of Tuberculosis, and the conditions which predispose to its acquirement. Article II.—The Prevention of Tuberculosis. Article III.—The Pathology and Symptomatology of Pulmonary Tuberculosis. Article IV.—The Diagnosis of Pulmonary Tuberculosis. Article V.—The Prognosis of Pulmonary Tuberculosis. Article VI.—The Treatment of Tuberculosis, dietetic, hygienic and symptomatic. Article VII —The Climatic Treatment. Article VIII.—The Specific Treatment. Article IX.—Laryngeal Tuberculosis, its diagnosis and treatment. Article X.—Institutions for the Treatment of Pulmonary Tuberculosis.

THE PATHOLOGY AND SYMPTOMATOLOGY OF PULMONARY TUBERCULOSIS.

(CONTINUED FROM VOL. I, PAGE 278.)

In most instances in which the patient calls upon his physician because of cough or impairment of the general health, there is usually something going wrong in a formerly latent tubercular area, and often we find impending destructive changes, or a cavity already formed and discharging.

If but a small caseous mass was present, or only one of several has softened, and the remainder of the deposit has undergone fibroid change, or is encapsulated, the probability is that with the discharge, the patient will soon regain his former accustomed health.

He will have some fever, according to the amount of tissue which is involved, but the more of fibroid tissue present, the less the temperature will be disturbed, and there are cases in which a cavity forms and discharges without any material rise of temperature at any time.

If, however, catarrhal pneumonic processes are associated, the temperature curve is for the time that of the pneumonia, and if the latter undergoes resolution, the fever due to it will subside in the course of a week at most.

It is quite different when such a pneumonic exudate also becomes caseous, for then the "acute form of phthisis" results as heretofore described, the severity of the case being in proportion to the extent of the caseous change, and the rapidity of the softening and the absorption.

In the fibroid form, without caseous pneumonia, the softening is usually quite circumscribed, the fever becomes slightly hectic, and severe night sweats occur as a rule only near the time when the cavity is ready to discharge; the cough is due to co-existing bronchial inflammation and is usually not severe.

If expectoration is present it is first mucous or mucopurulent, and due to simple catarrhal bronchitis, containing nothing characteristic at all.

If softening occurs independently without coinciding bronchial inflammation, there is usually no marked cough at all, until with the first perforation into smaller bronchi, the caseous detritus causes inflammation of the bronchioles or bronchi, into which the discharge takes place; this causes reflex cough of a dry character, and only after there is free secretion of mucous from the inflamed bronchial mucous membranes is there any sputum; the bronchial secretion forming the vehicle for the cavity contents, which contains tubercle bacilli.

The general health becomes impaired in proportion to the existing fever and the duration of this stage. I have seen cases where the time intervening between the first symptoms and the outward discharge of the cavity was less than two weeks, and again where from six weeks to twice that time the symptoms of liquefaction and absorption continued.

The constitutional symptoms in this process are those of auto-intoxication from the liquefying caseous tissue, which causes the damage to the general health.

Often circumscribed pleurisy or, at least, a sense of soreness indicates the seat of the involved area, but until the cavity is actually formed and has discharged, its exact seat cannot often be diagnosed with certainty; frequent seats are between the inner angle of the spine of the scapula and the vertebral column, below the inner third of the clavicle, or in the extreme apex itself.

A very dull or almost flat percussion note and bronchial expiration may aid in locating the spot, where, when it is evacuated and air enters, the cavernous phenomena will later be observed.

When the accompanying inflammatory changes approach the pleural layer, it becomes inflamed. Quite often pleuritic inflammation occurs also at the base of the same lung perpendicularly below the destructive process in the upper lobe, and gives rise to subjective and objective symptoms. In some instances of pleural inflammation in the upper lobe there is no pain at all, owing to deficient expansive motion of that part.

These pleurisies are usually of the dry and circumscribed variety and result in adhesions with more or less thickening of the pleura.

After the cavity has discharged, all symptoms improve; the fever becomes much reduced, the chills and chilly sensation are no longer observed, the appetite returns and though cough and expectoration may continue, they also grow less from day to day, and if no complications or accidents intervene, the patient regains his health. The cavity may shrink or become obliterated, or so small that after several months we can no longer demonstrate it by physical examination. The whole process may now stop and permanent recovery ensue.

This is, however, not so likely to be the case, as it is in a latent deposit. If living and virulent tubercle bacilli are present in the destroyed tissue, they are usually absorbed and transported to other parts, and a new eruption of tubercles soon occurs. Frequently we note this extension first in the opposite lung along the sternal border in the first and second interspaces, or in the apex. In such instances, the absorption fever of the stage of softening is either replaced, or soon followed by the new eruptive fever, the same as I have described it in connection with the formation of tubercles. The new deposit may subsequently become latent, or not, according to the peculiar conditions and circumstances which govern the individual case.

Subsequent repetitions of such attacks are, however, often observed, more caseous tissue softens either in the primary involved area or in the secondary deposits in the opposite lung, and one may often observe a rapid destructive course in the last deposit, while only slight destruction occurred in the old fibroid part.

In some patients the destructive processes are small and limited by the surrounding tissues, and pneumonic complications are less liable to occur, or if they do, the exudate may be absorbed and more fibroid tissue is formed. The new tubercular deposits also tend to fibroid changes and we may note intervening periods of many months or years, during which the patient is in fair health, with a minimum of symptoms or none at all.

If open cavities remain, they may secrete at time but little; even if from accidental conditions they become inflamed or hemorrhage takes place, there is often but little disturbance of the general health and the patient soon recovers his former accustomed state. Such cases are spoken of by the laity as "old fashioned consumption" and may extend over periods of ten, twenty or more years.

Although we have no strictly scientific explanation to offer, for so benign a course, one cannot help but feel, that there is something peculiar in the individual, call it resistance, or relative immunity, or peculiarity of tissues, or whatever we like, that manifests itself in this way.

Such an impression becomes still more justified when we observe a like course in several members of the same family, which is not at all uncommon. I could give instances where three or four and in one instance even five members of the same family came under my care, and in each this tendency to chronic fibroid change was predominant and characteristic, while in other instances I have observed the more rapid, destructive course of the catarrhal exudative form in like numbers of brothers and sisters of one family.

The location and natural drainage of a cavity has an important bearing upon the course of the disease, no matter to what class it may conform. When a cavity is not well drained and its free discharge is interfered with, the retained secretions are absorbed and cause a continuance or return of symptoms that were present during the softening process; with intervening days of amelioration, when the discharge is free.

Such patients make little progress towards radical improvement, often weeks and months pass with temporary "ups and downs," until a free outlet is finally formed, or the patient becomes exhausted.

The unfavorable termination is often hastened by, or is entirely due to, intercurrent pneumonic inflammation.

These secondary pneumonias I have learned to fear, especially in cases with large obstructed or suppurating cavities which discharge suddenly or only when the patient assumes a favorable position, when a large amount of sputum is coughed up in a short time. They also occur after hemorrhage from cavities, the infectious secretions becoming mixed with the flowing blood, which is aspirated into other portions of the lungs especially when the cough is severe or when the hemorrhage is profuse.

They also occur frequently toward the close of life and at other times when the reflexes are diminished, as during sleep, or when patients are given full doses of opiates; or pneumonia may result from simple gravitation of such secretions into the lower lobes, or into the side upon which the patient sleeps.

In either case the occurrence of pneumonias often mark the change in type from the fibroid to the

CATARRHAL EXUDATIVE FORM OF PHTHISIS.

In this form the anatomo-pathological changes which characterize it are inflammatory in character, the exudate being round-celled and interstitial, with tendency to rapid caseation, although resolution and absorption can occur. It is the so-called desquamative pneumonia first described by Buhl and with it there is catarrh of the aveoli and bronchioles. Unless rapid caseation occurs in mass, tubercles are usually found situated in the inflamed areas adjacent and amidst the inflammatory products.

Besides the pneumonic area, we find the first and older deposits of tubercle in the lung, in various states of fibroid or caseous transformation, cavity formation, etc., and more recent eruption of tubercle situated in the otherwise normal parenchyma in other parts of both lungs.

The clinical features of this form are a more rapid and acute course, with destructive rather than constructive tendencies, hence higher fever, of a continued type during active inflammation, hectic in the intervals, with frequent chills and profuse sweats, rapid excavation, more frequent and severer haemorrhages, greater wasting and exhaustion.

The pneumonic complications may characterize the beginning, or appear later in the first area involved. The pneumonic centers may be small and single or large and multiple, such inflammations may recur at frequent intervals or not, the exudate may undergo resolution, and the area may remain free from tubercles, it may clear up and tubercles may form thereafter, and the latter may then caseate and break down, or undergo fibroid change. On the other hand, the pneumonic area may caseate in mass, break down and form a cavity. The latter may clean itself rapidly and heal or it may suppurate, extend and become larger, the destructive process may give rise to haemorrhages, more or less profuse, or there may be no haemorrhage at all. Such occurrences and complications, or their absence, determine the course and final issue of the case.

Most cases of chronic phthisis present combinations of the fibroid and pneumonic forms, and also of a third form yet to be mentioned, namely:

THE BRONCHIAL FORM OF CHRONIC PHTHISIS.

The anatomical changes impress one with the probability that here the infection was more direct, perhaps by inhalation and primary localization of tubercles in the mucous membrane of the smaller bronchi.

In more recent cases miliary tubercles are found in the mucous membrane, or we find erosions and tubercular ulcers having irregular edges, and a grayish or yellowish gray base.

With the enlargement of these ulcers the bronchioles are often perforated and the peri-bronchial connective tissue, lymphatics and vessels, and eventually the lung parenchyma itself, participate in the process.

In more advanced stages the bronchioles are found obliterated and filled with soft, caseous material, and caseous nodules, located peripherally, either softened and discharging, or encapsuled, communicate with or project into these bronchi, constituting the so-called caseous peribronchitis.

In other cases the pathological changes are distinctly and primarily peri-bronchial, and appear to have their point of departure from the peribronchial glands and lymphatics, which in their course toward the alveoli are found thickly stuffed and studded with tubercles.

The connective tissue participates by inflammatory proliferation and contraction, so that the bronchi appear surrounded and encased by the increased connective tissue. The bronchioles and bronchi in front of the obstruction may become dilated or sacculated by traction through peripheral shrinking, or increased intra-pulmonary pressure from cough. Their lumen is at times interfered with by pressure of nodular masses from without. The mucous membrane is in a catarrhal state, anaemic and often eroded and may become the seat of tubercle eruption and eventually of ulceration as well.

Clinically the bronchial form is often difficult to distinguish, except perhaps by the severity of the cough which seems entirely out of proportion to the physical changes which we can make out by examination of the chest. The cough is usually dry and unavailing for a long time.

When the process is chiefly peri-bronchial and is attended by increased formation of connective tissue and by its induration, the expectoration is slight, and usually mucous, due to passive congestion of the bronchial mucous membrane, tubercle bacilli are not found until caseous tubercle have softened and broken through a bronchus or until the mucous membrane has itself become involved and ulcers have formed upon its surface.

Sooner or later, however, the lung parenchyma is also invaded, and then the features of either the fibroid or catarrhal exudative form predominate, but both forms are usually combined.

Having now outlined the different forms of phthisis, I repeat what I stated in the beginning that no distinct lines can be drawn and that any such attempt proves confusing and unsatisfactory both to the writer and the reader. Enough has, however, been said to enable one to appreciate the complexity of the pathological changes which may occur, and the most important fact, which I desire to emphasize once more, is that incidental inflammations of the catarrhal pneumonic type are serious complications and are largely responsible for, and play the most important role in the advances and final adverse results of the disease under consideration.

PULMONARY CAVITIES.

In connection with the pathological changes in the course of phthisis, I have frequently spoken of the formation of cavities, as resulting from the disintegration and liquefaction of caseous tubercles, or of caseous pneumonic exudates.

In post-mortem examinations of patients who have died of phthisis we rarely fail to find them. Sometimes the cavity is still closed and contains a softened mass of purulent, cheesy detritus, at other times it is open and communicates more or less freely with one or more bronchial tubes.

The walls of such cavities may be ragged, caseous and irregular, or smooth and clean, sometimes we find portions of a cavity smooth and clean, while other parts show the caseous wall still in a state of breaking down.

Besides true pulmonary cavities there are also found those which result from bronchial dilatations, and which, before extensive ulceration has occurred upon their surface, can be easily distinguished by their mucous lining, or by portions of mucous membrane still retained, when in other parts the membrane has been destroyed.

These bronchiectatic cavities are either spindle-form dilatations of a bronchus or they are sacculated when only a portion of the wall has yielded to sudden pressure from cough, or to traction in connection with cicatricial changes from without.

The sacculated form soon becomes ulcerated through erosion from the stagnating and irritating contents, and the base and edges of the newly formed ulcers are often the seat of tubercles. The discharge, when coughed up may be very offensive, and on that account may cause and justify the suspicion of putrid bronchitis or even of gangrene being present.

When the entire mucous lining is destroyed the brochiectatic cavity cannot be distinguished from the pulmonary form, and it may happen that one kind of cavity forms a communication with another by destructive ulceration of the intervening wall.

In like manner several such cavities of one variety or the other or of both may form one large irregular cavity or a labyrinth of communicating cavities, in which the partial remains of the partition walls can still be recognized.

The caseation of a conglomerate mass of tubercles includes the lung tissues in which the tubercles are formed; the blood vessels, especially the arterial branches, are, however, more resistant, and even if partially or completely obstructed by endo-arteritis or thrombi, they can often be distinguished and traced through the caseous mass. After liquefaction and outward discharge of the purulent caseous material such vessels may at times be seen to pass through the cavity or project from its walls, pervious, or partially so, or as fibroid strings having resisted disintegration to the last.

If their lumen is not obliterated they frequently become dilated and form aneurismal sacs of various sizes. Such a vessel is apt to yield to the increased arterial pressure on account of its non-supported or diseased wall. The aneurism may project into and fill out more or less completely the excavated space. Hemorrhage, from recent cavities due to rupture of exposed capillaries and of larger pervious vessels is therefore of frequent occurrence, and when the branch is large, the bleeding is proportionally severe, in rare instances it may be so profuse and uncontrollable that it leads to death either by syncope or suffocation. Such dilatation and rupture may occur even at a later period, when the cavity has become clean and is healing out. But at such a period the induration and shrinking of the cavity wall interferes more particularly with the free return of the blood through the more compressible veins, and they are liable to rupture under severe exertion, giving rise also to more or less severe bleeding, which, however, ceases more readily, and as quickly as the increased pressure is relieved.

Obliterated vessels in cavities may maintain themselves for a long time, and appear as fibrous strings across, or as ridges in the walls, and when finally destroyed, the stumps may still be marked as a grayish, or slate gray projection.

In addition to a large or a number of smaller communicating cavities, there may be a number of quite small ones from the smallest size to that of a pea or filbert, and an entire lobe may be riddled with them; some of them open and others still retaining their softened contents, they give the lung a sort of honey-combed appearance.

Less frequently a cavity heals out completely, the walls are then found smooth or still granulating, and surrounded by a connective tissue wall, which shrinks and reduces the cavity from its former size; or entirely obliterates it by compression and final adhesion of the surfaces, when a shrunken cicatrix, perhaps with emphysematous lobules in its immediate vicinity, are left to mark its place.

The liquefied contents of a closed cavity may become inspissated, and the fluid portions be absorbed. The thickening mass becomes harder, chalk like, and after a long time it assumes a stone like appearance, a change which has been described under the term of calcareous phthisis.

Subsequent ulceration and suppuration may occur upon the periphery of a calcareous mass, which if not too large may enter a bronchus with the secretions, and be expectorated or in rare instances cause suffocation.

I have myself seen such a case, where, upon post-mortem examination, a stone as large as a good-sized filbert was arrested in the glottis, and caused the patient's death.

Smaller concretions feeling like particles of grit are more often coughed up and such patients have occasionally called my attention to larger concretions the size of a pea or bean. The breaking up of such calcareous masses is apt to be attended by hemorrhage. Caseous glands become calcareous more frequently than caseous tubercles in the lung parenchyma..

In rarer instances still a cavity becomes gangrenous, the walls are found ragged and like their contents present greenish necrotic masses, in various states of decomposition.

Pulmonary cavities, if not primarily subpleural, sooner or later reach the pleural surface, in either case the pleura becomes inflamed and the surfaces become adherent, so that the chest wall forms the actual boundary of the cavity.

Such adhesive inflammation becomes thus conservative, preventing as it does the otherwise possible rupture and discharge of the cavity into the pleural sac; and but for it, pneumo-thorax would be a much more frequent accident than it is in the course of phthisis.

PNEUMO-THORAX.

When a subpleural cavity forms or enlarges rapidly, before sufficiently firm adhesions have been formed, perforation is liable to occur, and at times this accident is observed in a comparatively early period of phthisis, especially in the catarrhal exudative form.

With such a perforation, a communication with a sufficiently large bronchus does not always form, so that air enters freely enough to cause striking symptoms. The opening may be very minute, and may at once become obstructed by thick, caseous cavity contents, or through compression of the retracting lung tissue. In such instances, acute pleural inflammation, circumscribed at the point of perforation, or of the whole pleural sac results, which may seal the perforation permanently.

Unless the condition has been closely observed, there may not even be a suspicion of the danger which has threatened the patient, and only when we are perfectly familiar with the local auscultatory and percussion phenomena before the accident, and make a comparative examination soon thereafter, are we liable to recognize the true state of affairs in such comparatively favorable cases.

An instance of this nature occurred in my practice several years ago; (1) and had a chest examination not been made before and after the onset of symptoms, the case could have been passed as one of acute pleurisy with effusion, since on the second day the escaped air was nearly all absorbed. The upper part of the lower and the entire upper lobe were undoubtedly bound down by firm adhesions and therefore the compression of the lung was only partial and the symptoms less severe.

Cases occur, however, in which the pneumo-thorax is still more circumscribed, and its extent is determined by the adhesions which were previously formed. Subsequent enlargement of the circumscribed form takes place by gradual separation of more recent adhesions and in any case as far as consolidation and adhesions will permit, the lung retracts and becomes compressed.

The further course depends upon the nature of the opening, upon its continuance and upon the occurrence or non-occurrence of infection of the pleural sac from the ruptured cavity. If the opening is free and unrestricted, and the communication is not interfered with by a valvular obstruction, the immediate symptoms which, while severe, become not as urgent as they do in cases in which a valve like opening prevents the equalization of pressure within the chest cavity with the external air. In such cases air is forced in with every inspiration, and none can return, causing eventually orthopnoea, and the internal pressure and displacement of organs becomes extreme. Such cases prove rapidly fatal, and often before we can afford any aid.

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(1) Mrs. B. M. had been under my care for several months, her clinical history presenting nothing unusual from the ordinary course of subacute catarrhal phthisis, with progressive excavation in the left upper lobe. The records show normal condition in the lower lobe, from the base, upward, to the lower angle of scapula, and the fifth, fourth and third rib forward toward the sternum. Three days after the last record noting the freedom from phenomena in this lower lobe, as stated, this patient complained of a sudden, acute pain in the left axilla, extending quickly downward and rapidly involving the lower portion of the left side of the chest. A full hypodermic injection of morphia relieved the pain, but not the attending shortness of breath; nor did it restore the small and rapid pulse to its previous state. Percussion now showed moderate, tympanitic resonance, and absence of the respiratory murmur over the previously named normal part of the left lower lobe. On the second day these objective phenomena had partially disappeared and were replaced by pleural friction sounds with evidence of a liquid exudate at the base; the latter increased rapidly upon the following days, so that on the seventh day resection became necessary, on account of the high fever and chills, displacement of the heart with attending symptoms of irregular pulse and insufficient oxidation. The exudate was sero-purulent. The lung resumed its normal limits, and the previously evident perforation remained permanently closed.

In one of my cases in which such a condition probably existed the patient was already in collapse when I pushed a trocar through one of the dense and outward bulging intercostal spaces; upon withdrawal the air rushed out through the canula with great force and the procedure gave considerable immediate relief, averting for the time the impending death of the patient.

In all my cases, with only one single exception, the perforation occurred on the left side, and, as a rule, in the axillary line between the third and fourth rib, to which region the sharp, tearing pain was invariably referred.

When the pneumo-thorax is complete and involves the whole side, the heart and mediastinum are pushed toward the opposite side, the diaphragm is pushed downward and remains below the false ribs. There is no respiratory motion whatever of the affected side, the intercostal spaces bulge, or at least become obliterated and the resonance is loud tympanitic.

Characteristic is the sharp, cutting, tearing pain, which is the first symptom, and the patient may state positively that he felt something tear or give way. Dyspnoea occurs immediately and becomes greater with every breath. At the same time the pulse becomes small and very frequent.

If the perforation occurs in a far advanced stage, and the lung is extensively diseased and adherent throughout, the dyspnoea occurs more gradual, and may not reach an extreme degree. But as a rule a sharp, cutting pain and dyspnoea are the two cardinal subjective symptoms, and the more sudden the onset, and the more rapidly the dyspnoea increases, the greater is the probability that perforation has taken place.

Even without a physical examination one should not make the mistake of confounding such a condition with an attack of asthma as I have observed in a case seen in consultation with a colleague; since with asthma there is no evidence of shock or of pain. If any doubt exists the entire absence of the respiratory murmur, over a large, tympanitic area, the displacement of organs, etc., should quickly clear it up.

If the pneumo-thorax is extensive, death may ensue in collapse within a few hours, from shock and failure of the circulation. The more advanced the patient is in his local lung disease and in his general exhaustion, the more rapidly will the heart give out, being already greatly enfeebled in its action in such an advanced stage.

If death does not follow immediately or in the course of a few days, the occurrence of complete pneumo-thorax nevertheless marks the beginning of the end in all but a few of the exceptional cases in which cavity contents does not escape into the pleural cavity; or in which the patient is able to withstand the immediate effect, and that of the quickly resulting suppurative pleurisy.

Under any circumstances it is one of the most grave and serious accidents that can befall a phthisical patient, and I have myself not known one single case that ultimately recovered when it resulted in the course of phthisis, although I have records of one patient who lived five months, one over eighteen months, and one over two years, after the accident. In the one patient who lived five months the pleural suppuration continued to the end despite every effort for its control; the patient who lived eighteen months had no escape of cavity contents, and only circumscribed pleurisy occurred; but the lung never expanded and the patient could never again take any exercise on account of severe dyspnoea, and the upper lobe continued to suppurate and break down to the end. The paient who lived over two years had suppurative pleurisy following the perforation and was resected, the lung expanded partially after the closure of the wound, which healed promptly; and this is the only case in which pneumo-thorax did not manifestly contribute to the subsequent unfavorable course.

The favorable terminations of which some writers speak, in which the air pressure is said to have caused the permanent closure of the opening, and then the pleural exudate caused the absorption of the air, and in its turn the exudate was absorbed, and in which finally the lung reexpanded, and the disease in the perforated lung became permanently arrested, it has not been my good fortune to meet.

My cases in which death did not occur as an immediate consequence made only a partial recovery, the exudates when present required mechanical removal; they were purulent in all but a sngle case, where it was bloody-serous; and, as already stated, they all died of the progressing lung affection, not excepting two cases in which no exudate formed at all, and the evidently sterile air which entered the chest cavity was subsequently and gradually absorbed.

The exudate, as I found it when death occurred in the course of a few days or a week, was serous-cloudy, and a purulent character predominated the more, the longer the patient's life had been prolonged. In several of my cases the escaped cavity contents could still be recognized, and in one instance in which death occurred on the fourth day muco-purulent sputum was swimming on top of the liquid when the chest was opened. In another, the rupture appeared to have opened a vessel of considerable size, nearly a quart of blood being found in the pleural sac.

The frequency of pneumo-thorax is variously estimated, and some authors (Powell) state it to be as high as 5 per cent. in the course of phthisis. This is not my experience. In 2000 of my continuous records, there were 23 cases of pneumo-thorax, and these include five partial cases; but do not include four others in which perforation occurred in connection with empyema and in which the purulent collection had eroded the lung and had broken through into a bronchus.

An equally constant phenomenon in the progressive stages of phthisis is the

BRONCHIAL CATARRH.

In the period of tubercle eruption the catarrh is strictly limited to the alveoli and bronchioles in the involved area, and it subsides when the inflammatory reaction to the tubercle formation has disappeared.

Incidentally contracted colds may cause bronchitis, and while in adults such a catarrh involves as a rule only the larger bronchi, in the functionally deficient area of a latent tubercular deposit, the bronchial inflammation is prone to extend deeper.

Once established there, the bronchitis is obstinate and requires a longer time for its subsidence than we are accustomed to witness when the affection occurs in previously normal lung tissue.

With the advent of the phthisical stage, i. e., the inauguration of destructive changes, and formation of cavity, the mucous membrane of the smaller bronchi become congested, and the secretions give rise to fine rales. With the discharge of the cavity the irritation caused by the outward passage of the liquefied contents maintains the catarrh or induces it if not previously present, especially in those bronchi over which the discharge must pass.

The aspiration of these discharges does not always lead to pneumonia, but frequently to inflammation of those bronchi into which the secretions are drawn with a deep inspiration, and the catarrh of the larger bronchi in the lower lobes is sometimes due to simple gravitation of sputum, especially when it is purulent and therefore less tenacious.

More frequently do we note catarrh in the non-tubercular lung portions in the advancing disease through the occurrence of emphysema, and toward the end, the passive venous congestion attending the gradual failure of the circulation in the lung contributes greatly to catarrhal states of the bronchi.

PLEURISY.

Although usually classed with the complications, the occurrence of pleurisy in the course of pulmonary tuberculosis is so constantly observed, that it may as well be considered as part of the disease. In every autopsy there is evidence of previous pleural inflammation, and one or both the upper lobes are always found adherent to the chest wall.

Often the pleural inflammation precedes the recognizable changes in the lung for months and years, and the relation of such attacks of pleurisy to the later developing lung disease has been a matter of great interest.

Many clinicians are inclined to look upon all pleural inflammations as of tubercular origin, when a relation to other acute and infectious diseases, malignant growths and non-tubercular inflammation in contiguous parts can be excluded.

The published reports of pathological examinations, as for instance by Wiegert, Fraenkel, Friedlers, Jakowsky and especially those of Schlenker, show the relation of pleurisy to tuberculosis to be very frequent. The last named author found evidence of tuberculosis in sixty-one out of eighty-five cases of pleurisy examined.

The clinical fact, however, that some persons who have previously suffered from pleurisy, do not subsequently become consumptives, and that others who have had pleurisy suffer many years later of pulmonary tuberculosis, appears to me insufficient evidence for concluding that the pleurisy does not, or does stand in relation to the lung disease; the like appears to me is true with the bacteriological examinations of exudates, in which the absence of tubercle bacilli does not disprove the tubercular origin of the pleurisy.

The pleural inflammation may have its origin outside of the pleural sac, and be an extension from inflamed tubercular glands and lymphatics, which, like the deep cervical, bronchial or mediastinal glands, are usually not accessible to diagnostic methods.

With such an origin the pleura and lung parenchyma do not necessarily become the seat of tubercles, but if tubercles are formed, the clinical and physical symptoms are liable to become obscured by the pleurisy, after the subsidence of which the tubercular process may become latent, and eventually heal, without causing distinctive symptoms during the life of the patient.

On the other hand, a pleuritic inflammation which has no relation to tubercles whatever, may predispose the lung to subsequent tubercular disease, through interference with its nutrition by adhesions, compression from exudates, etc.

Adopting the method of exclusion and having eliminated all other causes for the pleural inflammation with which we are acquainted apart from tuberculosis, the question arises, Should we reognize a form of pleural inflammation, due to cold or exposure, originating in the pleura and having no connection with tuberculosis?

Such a question can at most be answered theoretically, the theory being based upon analogy with inflammation of other serous membranes, and the peritoneum naturally suggests itself.

Have we such a form of peritonitis?

A decade or two ago there would have been many affirmative voices, but not so now. At the present time we feel quite certain that inflammation of the peritoneum is always caused by extension or through infection, from parts it covers, or by the escape into its cavity, from without, of some substance capable of exciting inflammation.

In all probability the pleural serous sac is subject to the same laws and conditions, and I myself do not believe in pleural inflammation being idiopathic, or directly caused by a cold, any more than I do in peritonitis having such an origin.

Nevertheless, I have at times known a pleurisy to occur after exposure, the same as we occasionally observe a pneumonia follow, when a person becomes severely chilled, but I believe that in either case there are additional determining and coinciding factors as yet not fully understood.

If we examine into the cause of inflammation of the serous membranes of joints and exclude syphilis, gonorrhoea and rheumatism, and inflammations which extend to the joints from adjacent parts, the same experience confronts us, and idiopathic disease of the synovial membrane of joints has no recognized standing.

If, therefore, we speak of idiopathic pleurisy we should mean inflammation of the pleural sac for which we cannot find the related cause, but this should always be assumed to be tubercular, for prudential reasons, in order to assure a conservative future course in advice and treatment.

No doubt is ever raised as to the relations of pleural inflammations to tuberculosis of the lungs, when it occurs after the lung disease has advanced sufficiently far to cause symptoms or to be demonstrable by physical examination; but even then the pleurisy which we find so associated is not necessarily due to the eruption of tubercles upon the serous membrane, in fact, in the majority of instances this is not the case.

Pleural inflammations may be acute, sub-acute or chronic, circumscribed or diffuse. The accompanying exudate may be fibrinous, fibro-serous, serous, purulent or haemorrhagic, and the amount may be so slight we cannot appreciate it, or sufficiently large to fill the pleural sac.

In the circumscribed form it is usually fibrinous, while a serous or fibrino-serous character is the rule in the acute variety. With extensive eruption of tubercles upon the serous membrane it is often haemorrhagic. Tubercle bacilli are rarely found in removed exudates; they have been more frequently demonstrated in organized adhesions, suggesting that the tubercles formed, had their origin from the same infectious material which gave rise to the pleurisy, and that, owing to the slow growth of the tubercle bacillus, tubercles developed later, after the primary inflammation had subsided.

DRY CIRCUMSCRIBED PLEURISY is of very frequent occurrence in the course of pulmonary phthisis. In this form the fibrinous exudate is small, but enough to glue the pleural surfaces together, as it becomes organized into adhesive layers or bands. It is always due to the extension of inflammatory changes from the subjacent lung tissue, the seat of pneumonic or caseous processes, or of recent excavation, or it occurs with a sub-pleural eruption of tubercle, the reactive inflammatory changes extending to the pleura. It does not exert any particular influence upon the lung disease, but in some instances it is conservative by preventing perforation.

A circumscribed character must, however, not be assumed by the limited area of pain, but must be determined by physical examination. The diagnosis of a circumscribed character is supported by the absence of rise in, or increase of temperature, and eventually by the quick subsidence of symptoms. When the pleurisy is interlobular there are no physical signs at all.

The pain in circumscribed pleurisy, though usually quite sharp, stitch-like or piercing, is at times of a dull or sore character; it occurs with inspiration, with coughing or laughing, and often with change in position or on turning in bed. The respiration is short in proportion as the pain is felt in the earlier or later period of the inspiratory movement; in some cases the pain is located by the patient at a distance from the locality where we observe pleuritic friction or tenderness on external pressure. The cough may be increased but slightly or not at all. Mild cases are often mistaken for intercostal neuralgia or for muscular rheumatism.

Under appropriate treatment, and often without it, the pain disappears so far within a day or two that it is not felt except with severe cough or deep inspiration, and in a few days more it disappears entirely.

It is, however, frequently followed by a recurrence in the same locality, or in its immediate vicinity, or by the involvement of a new area, usually in the lower lobe, immediately below the first pleuritic spot, if this was in the upper lobe. General involvement of the pleura may also occur from subsequent extension of this form.

Dry Extending Pleurisy has the same clinical symptoms as the circumscribed variety, and pursues a sub-acute or chronic course. The fibro-plastic exudate becomes well marked, giving rise to pleural thickening, at times to a degree that on gentle percussion the note may be quite dull or almost flat. The entire pleural sac may gradually become involved, but the symptoms persist, especially at the base of the lung. The pain is more frequently dull, and is not much influenced by the movement of the chest in respiration; the accompanying fever is slight, so that it is often difficult to say in how far it may be due to pleurisy or to other pathological changes within the lung. I have seen such cases without any elevation of temperature whatever.

Acute Exudative Pleurisy is much less frequent in the course of phthisis than the dry circumscribed variety; when it occurs it is usually in the course of catarrhal phthisis, with pneumonia or with destructive processes. Its symptoms are more severe; chill or chilly sensations may coincide with rapid rise of temperature, which on the first day reaches 102° F. and over; in very acute cases I have seen it reach 105° F. The pain is sharp and stitch-like with inspiration and coughing, and may radiate to the shoulder and other parts of the chest, and also into the abdomen. Shortness of breath in the beginning is caused by the pain, and may reach a degree to make one think of pneumo-thorax, but when the pain is relieved the respiration becomes quiet. Dyspnoea may, however, appear at a later period through compression of the lung by the exudate.

The temperature usually remains high during the first and often during the second week, and the pulse is increased in proportion to the fever. The impulse to cough is certainly increased in most cases, although some patients appear to cough less than they did before, owing to their desire to avoid the attending pain.

In the beginning the patient lies on the well side to avoid the pain from pressure; later, as the exudate increases and the opposite lung assumes more and more the function of respiration, the patient breathes easier by lying on the affected side; at that time the pain has either greatly subsided or has disappeared entirely.

When the exudate fills the greater part of the affected side the patient assumes a sitting position in which the liquid distends the lower portion of the chest wall and presses the diaphragm downward. thus allowing more room for expansion of the partially compressed lung.

If the left side is affected, urgent symptoms of displacement of the heart and great vessels may appear earlier; these always compel the mechanical removal of the exudate.

The inflammation may cease at any stage. In most cases the liquid exudate becomes appreciable, and usually reaches the fourth rib before it becomes stationary.

The temperature then declines and with the absorption of the exudate it reaches the normal during the morning hours, to rise again to 101° or nearly so. Ordinarily it takes a month to six weeks before recovery is complete. The fibrinous residue left becomes organized in firm adhesions with the costal surface.

If aspiration is resorted to before the acute inflammation has subsided, the exudate is liable to return though as a rule not to the same degree as before.

With a purulent exudate, symptoms due to its absorption supervene in the form of chills, hectic fever and nightsweats, which continue until its removal.

In some cases the pleurisy develops insidiously and, in rare instances, without any symptoms except those caused by pressure from the liquid; cases have been observed where even the temperature remained normal. In all my cases in which there was neither pain nor cough there was always more or less fever.

In neglected cases the lung remains permanently compressed and frequently the sero-fibrinous fluid becomes purulent. Erosion and perforation of the lung, with discharge into a bronchus, and in rare instances perforation through an intercostal space, may finally occur.

Pleurisy with liquid exudation, whether acute or chronic, and though managed most skillfully, has a more or less unfavorable influence, at least upon the immediate future course of the lung disease. The nutrition of the patient suffers during its existence in proportion to the acuteness, severity and duration of the attack.

Purulent exudates are often exceedingly obstinate to the most painstaking surgical treatment and the long continued suppuration becomes then a severe drain upon the patient. In many cases where resection becomes necessary, the thoracic fistula fails to close, and further operative measures for its obliteration and that of the pleural cavity, being necessarily severe, are usually contra-indicated by advance of the general lung disease and the exhaustion of the patient.

THE FEVER.

This is the most constant symptom of the beginning lung disease, and may precede cough and expectoration for weeks and months. With the eruption of tubercles the degree of fever is proportionate to the involved area, and when confined to one lobe or portion of a lobe it rarely exceeds 100.5° F.

The elevation begins usually toward evening and the ascent is very gradual, but a hearty meal and physical or mental exercise may temporarily incerase it, and may also cause it to begin earlier; the maximum may be reached in three or four hours, and the decline may be rapid or gradual; as a rule the temperature is again normal at bedtime.

In many cases the whole period of elevation comes within a few hours, and the entire rise is less than one degree Fahrenheit. This is the so-called eruptive fever, and it stops entirely when, after a period of from several weeks to as many months, the reactive inflammatory changes peripheral to the tubercles have subsided.

Recurrence of fever may indicate a new eruption of tubercles or the beginning softening of a caseous focus, and the longer the intermission has lasted the more likely is it, that the latter inference is the right one.

One must, however, not be hasty in forming conclusions, and the observation of the temperature curve for several days or weeks may be necessary to determine the true relation of affairs.

The fever may disappear again in a day or two, and either theory may thereby be disproved; in such cases we usually find a more recent latent deposit, which is temporarily congested perhaps from undue physical or mental exertion.

If a new area of lung is becoming involved in the formation of tubercles, a like course of fever as in the first instance will be observed; but if softening has become established, the temperature, while it may be slight for several days as with a new circumscribed eruption, gradually changes its type, reaches higher maxima in the evening, occurs earlier and lasts longer, and is likely to be preceded by slight chilly sensations, or with a distinct chill.

If we can demonstrate an involved area in an apex, which shows slight or pronounced dullness on percussion, and if the higher fever seems to stand in relation as a sequella to a bronchial inflammation, especially in connection with grippe, then the probability, of initiated destructive changes in this older deposit, becomes very great.

This fever initiates the truly phthisical stage, that is, it coincides and accompanies the destructive and suppurative processes of phthisis.

With softening of caseous tubercles the degree of the fever depends upon the extent of the involved area; a single caseous focus the size of a pea would scarcely produce much disturbance, but a dozen of such size, or even smaller, would offer a larger absorbing surface than a single mass twelve times its size. By this illustration I wish to show that multiple centers of softening are usually and necessarily attended with a severer type of fever than single ones. On the other hand, when a large mass is undergoing such a change, as for instance a large part of a lobe in caseous pneumonia, the symptomatic fever is proportionally severe and its duration is then much longer, because it takes a longer time for complete liquefaction and discharge of the larger mass.

Thus the fever belonging to the phthisical processes is of uncertain duration and as in extensive caseous pneumonia, it may continue until death.

If the case progresses in an unfavorable course other caseous deposits begin to soften, and eventually, softening areas, recent and old open cavities, some suppurating and others forming, are present at the same time. With such conditions the fever is often attended with severe and prolonged chill in its onset, the maximum becomes high and reaches 103 to 104° F., while in the morning the temperature is subnormal two or three degrees, almost bordering on collapse. Daily variations from 6 to 10° F. may occur and the most severe night sweats coincide with the sub-normal temperatures.

In more favorable cases, when the area of softening is rather small, and when there is not a rapid succession of other centers undergoing like changes, the fever disappears after the cavity is formed. I have known a small caseous mass to soften and the area to become excavated in the course of two or three weeks.

If a caseous mass is well encapsulated with fibroid tissue and it softens nevertheless, fever is often absent until the fibroid capsule is broken through and the contents have found their way into the peripheral tissues, in which the lymphatics are open. Then the fever becomes marked and continues without material amelioration until free discharge takes place into a bronchus, the same as we observe in other abscesses which discharge spontaneously.

If thereafter the fever still continues of the same type and with little reduction in degree, there is reason to believe, that other collections exist, which are making their way outward, or that retention at the bronchial outlet of the present cavity is the cause.

With a free outlet a slighter degree of fever of the same type continues for some time, and chilly sensations are rarely missed with its onset, especially if no precautions are taken to prevent them.

The chilly sensations are not so uniformly present in the eruptive stage; usually they are indicative of destructive processes, or suppuration; they may not even be spoken of or observed by the patient, but close inquiry elicits that there is a little shiver, a "goose skin" sensation, the hands or feet get cold, or perhaps the finger nails turn blue, and if the thermometer is diligently used we always find these sensations to correspond to the beginning rise of temperature.

Of course, to physicians who do not painstakingly look into these conditions, and take the temperature only at a regular visit, or at convenient times once or twice a day, such observations must necessarily escape, and I may as well say here as elsewhere, that to manage a case correctly, we require temperature observations at least once in two hours, in all cases that have active symptoms of any kind, and that in order to determine the nature of the fever, and to draw any valuable conclusions from its course and type, there are times and instances when even more frequent observations must be made at certain periods of the day

This slight hectic fever in the open stage may persist while the wall of the cavity is breaking down or suppuration is present. Like the fever which corresponds to the period of tubercle formation it is increased by exercise and moderated by rest. Under proper enforcement of the latter it becomes less, so that in favorable cases it soon remains below 100° F. when the patient's general improvement takes more rapid strides.

Many times, however, the fever again increases or is renewed without apparent cause. Retained secretions, new areas of softening, or new inflammations can perhaps be excluded, there is evidence that the cavity or cavities are getting dry, the sputum having gradually become less in amount and may now be only mucus, there are no rales, no new catarrhs, and to all appearance the lung condition is better than ever Yet there is renewed fever, which gradually grows higher, perhaps to 100° or 100.5°, and absolute rest in bed, which proved helpful before, will not entirely control it.

This renewed fever usually means new eruption of tubercles and a careful auscultator will soon discover their seat, by the rough inspiration and delicate crepitations in a previously normal area. At other times new evidences of softening occur with a renewed hectic type of fever, and in either case the phases of a new eruption, or of excavation, or of both must again be passed through.

Such interruptions, especially in the catarrhal exudative form of phthisis, are not uncommon, and may even surprise us, when we begin to think that the battle has been nearly won.

Pneumonia and pleurisies may also intervene, or the fever is augmented by gastro-intestinal complications; in some instances the whole clinical picture becomes extremely mixed and confused, especially if the case has only recently come under our care, or if we have not kept a watchful eye on every detail of the case.

With pneumonia or acute pleurisy, or with the fortunately less frequent development of acute, local or general, miliary tuberculosis, a continued type of fever is observed which may be superadded upon the type already existing.

Thus a patient who has hectic fever may suddenly have a higher maximum and the next morning intermission does not occur; instead we find that the patient had fever all night, and the first observation in the morning shows 100 or 101° F., or even more. If evidence of pleurisy exists this may account for it, but if there is no pain the probability is that pneumonia, perhaps of only slight extent, has occurred. These pneumonias are difficult to demonstrate by physical examination, the more so if a complete record of a recent physical examination is not available for comparison.

Very high continued temperatures and with irregular variations, or of an inversed type, speak the more for an acute miliary eruption in one or both lungs, or for general miliary tuberculosis, the less evidence we have of pneumonia or of pleurisy.

Continued fever indicates acute processes, either pneumonic, pleuritic or miliary, any one of which may intervene in the different stages and forms of chronic phthisis, their relative frequency being in the order named.

THE CAUSE OF THE FEVER in pulmonary tuberculosis is usually attributed to specific toxins derived from the tubercle bacillus, and more particularly so in the early and eruptive stages of the chronic and the acute miliary forms.

When with the advent of destructive stages the temperature assumes a more or less hectic type, the opinions differ, some authors holding the specific toxins responsible for this type also, while others take their refuge to the toxins from other associated pathogenic germs, chiefly of the pus-cocci and pneumo-cocci, and look upon the case as one of "mixed infection."

The fever which occurs with pneumonic and pleural inflammation is variously held to be due to either the influence of the toxins from the tubercle bacillus, which when penetrating previously healthy tissue are believed to be able to set up inflammation, or to be the advent of mixed infection, the particular germs having advanced into or having been mechanically transported to the involved parts.

As basis for these views the evidence is adduced, that toxins of the tubercle bacilli can produce fever, the proof for this being supposedly supplied by the fever effect of tuberculin; those who hold mixed infection responsible for the hectic type, point to the surgical and suppurative fevers as identical and having the same course and type.

To further hold the specific tubercle toxins responsible for this hectic type, which coincides with the absorption of liquefied caseous products and with pus, Prof. Cornet and others advocate the theory, that in the caseous tubercular area the specific toxins have accumulated and been stored up, no absorption thereof having taken place after caseation; but when such caseous material becomes liquefied the toxins are liberated and are absorbed in great quantitities, and the hectic fever is thus produced.

These theories are perhaps as good as others, but they are not proved; while fascinating, and to their respective advocates perhaps satisfactory, there are some objections to all, the same as to any theory yet advanced, to satisfactorily account for fever as a whole.

The objections to the specific toxin theory, in so far as it is attempted to be proved by the fact that tuberculin can cause fever, appear well founded, when we see that the specific products of Koch's bacilli can be administered in increasing doses to tubercular and non-tubercular persons, and that large doses can be reached, without ever disturbing the temperature in the least.

If, therefore, like toxins are absorbed from the tissues of tubercular patients, and if, as in the chronic form, the disease starts from a minute local center and extends, why is it that such a patient will not acquire toleration, the same as patients do or as do healthy persons when such toxins are artificially introduced?

The amount of toxins produced and available for absorption with the early formation of tubercles must be exceedingly small, and with the slow extension their increase must be small as well. Here we would have a right to presume that, with such gradual increase and absorption of toxins, if it occurs at all, there should be no fever in the early stage.

Yet if we make a diagnostic injection of only 1-10 of a milligram of the actual specific germ substance, we find that this same individual, who should have acquired toleration, responds in an unusual degree with fever; while a dose ten times as large given to a healthy person, who never received toxins artificially nor has produced toxins within his tissues, causes no response whatever.

Furthermore, in the therapeutic use of such specific remedies upon tubercular subjects, we find that we can often increase single doses by ten times the amount of the test dose, and it is therefore difficult to understand that the additional 1-10 milligram with which we tested was more than an organism charged with the poison for weeks, months or even years could stand, without the recurrence of fever.

When we further attempt to explain the hectic fever by the liberation and the absorption of toxins from the liquefying caseous tissues, we may ask again why toleration is not acquired, the same as we observed it to occur when large doses of tuberculin, which produced much fever, were purposely given to such patients?

It was then noted that upon the repetition of such fever producing doses the effect was usually much less from the second dose, and that after a few repetitions there was no response at all; and therefore we could often double or treble our doses without causing elevation of temperature.

Again, when patients who have passed through a course of hectic fever are tested with the specific germ products, they show marked fever reaction, and why, it may be asked, did they not acquire toleration to so small a dose, when in the therapeutic use of toxins we can reach doses ten times as great without disturbing the temperature in the least, and do this in the course of a few weeks?

The mixed infection theory of hectic fever stands on no firmer basis, and there is every reason to believe that much of it is erroneous and that a reversion from its popularity must soon take place. Nowadays it has reached a degree, at least with some physicians, that an intermittent type of fever, especially if it begins with chill and is followed by a sweat, is hardly questioned as to its cause, and mixed infection is accepted as a matter of course.

This is all the more true if an examination of sputum from such a patient shows some strepto-cocci or staphylo-cocci, although in most instances no precautions of any sort are observed in its collection, and the possible derivation of these cocci from the mouth, throat and bronchi is not even thought of, much less their pathogenic character determined.

The production of inflammatory changes by specific or non-specific proteins may be possible. We know that they occasionally cause well marked irritation in the local tissues, when injected hypodermically, which may be attended with redness, swelling and increases of the local temperature of the part; we must therefore admit that productive inflammatory changes which we see in the dry form of pleurisy and upon the periphery of tubercle, may be so produced, but such productive chronic inflammatory changes can run their course without fever, and inasmuch as the local effects and swelling, which are occasionally observed from injections of specific products, never suppurate, I would at any rate exclude the purulent and exudative forms of pleurisies and pneumonias as being caused in such manner, and would hold other pathogenic bacteria responsible for these inflammations; and to this extent I am willing to admit the theory of mixed infection as a cause of fever of a continuous type.

Having shown that all these theories are mostly speculative, and that all are more or less open to objections, I grant at once that my own theory may not appeal to all as more satisfactory than are those now current among students of this subject.

My own theories are, however, based upon the fact, demonstrated by myself and others, that when we inject sub-cutaneously or directly into the blood various proteid substances, the person so injected responds with fever, which may be attended with chill and be followed by a sweat.

A number of such experiments were made soon after the announcement of tuberculin and since, which show that ordinary bouillon, beef extract and beef peptones produce fever when injected subcutaneously, and more recently Dr. Cabbot of Boston (1) has shown that somatose in doses of 1-4 to 3-4 grains produces fever reactions in tubercular patients. I have myself obtained like results (2) from beef extract, beef peptone, normal blood serum and nuclein, and found that not only in tubercular, but also in non-tubercular persons, marked elevation of temperature can be produced, the onset being often attended with chill or chilly sensations, and the decline to be followed by copious perspiration.

For the induction of fever with the substances enumerated it required, as a rule, larger doses than are necessary for a test with tuberculin, and a hundred or more times larger, than when the soluble substance of the tubercle bacillus is used in its pure form.

Nevertheless, the fact remains that various albuminoid substances do produce fever, in the manner related; and, as Cabbot and others have shown, comparatively small quantities suffice for this purpose.

In non-tubercular persons the doses required in my trials were usually larger, but in most instances the resulting fever had the same type and followed the same course as the hectic fever in phthisis, and as far as the clinical manifestations are concerned they could not be distinguished; the degree of fever and the attending symptoms of malaise, chill and sweat, although variable in different individuals, appeared to stand in relation to the size of the dose.

Since with the disintegration and liquefaction of any animal tissues albuminoid substances become available for direct absorption into the blood, it appears perfectly natural and reasonable to me that, being absorbed, they produce fever, the same as when injected hypodermically. And as patients suffering from tuberculosis and phthisis remain keenly sensitive to specific germ products in the early, and moderately so in the later stage, whereas the gradual introduction of the artificial germ products can be accomplished without causing fever, and lasting toleration is obtained to even large doses, I believe that this proposition as to the fever in the stage of softening and excavation deserves further study and consideration.

Even the fever which is observed in the earliest periods may be more readily explained upon this theory than by that of specific toxin absorption, because with the increased activity and proliferation of the living cells, at the seat of the tubercle formation, there must be a correspondingly increased disintegration of cellular elements from which albuminoid substances are liberated and become available for absorption into the blood. This theory will even fit the fever which attends all inflammations, so that while pathogenic germs may be the cause of the increased vital changes, manifesting themselves in the phenomena which we designate as inflammation, and may also contribute to the necrosis of the tissues and of the exudates, the fever resulting from the absorption of the disintegrated tissues and exudates is produced by the liquefied and absorbed albuminoid products of which they are composed.

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(1) Journal of the Boston Society of Med. Sciences, Jan. 1899.
(2) New Orleans Med. and Surgical Journal, July, 1898.

I have, however, no doubt that in the disintegration of the bodies of the pathogenic bacteria albuminoid substances are also liberated from them, which are toxic in their nature, and which in themselves can produce fever in very minute quantities, as is shown for tubercle bacilli and a number of other germs; but I am equally convinced that when those specific products are absorbed they produce gradual toleration and eventually a more or less lasting immunity to the disease itself.

The non-occurrence of such toleration, and eventually of immunity in tuberculosis, speaks strongly for the fact that none or but most minute quantities of specific toxins are liberated and absorbed, and I see the reason for this in the great resistance of the tubercle bacillus to becoming dissolved or to giving up its specific proteid substances, not only in the laboratory, but also in the tissue, where we find their bodies still capable of demonstration, in old tubercular lesions which have undergone fibroid and even calcareous changes, years after the germs can have been living and decades after the manifest presence of tubercular disease in the locality where they are later found.

For the present I see no way of reconciling the absolutely demonstrated fact that tuberculin and the soluble substances of the bodies of tubercle bacilli produce fever reaction in minute doses in tubercular subjects, with the theory that identical toxins derived from tubercle bacilli in the patient's tissues produce the fever which accompanies the disease, because—

1st. The administration of tuberculin and of watery extract of tubercle bacilli can be accomplished by gradual increase of doses without in the least disturbing the temperature of the patient, and toleration to a hundred times the usual test dose or to twice that much can be secured in the course of several months; and,

2d. Because if toxins alike and identical in their action have been absorbed during the existence of the disease, the same toleration should occur and should be most marked in advanced cases (1).

When, however, we find that not only is there no toleration shown to exist in any stage of the disease and that in fact even far advanced patients remain sensitive as a rule to doses which are rarely productive of fever in non-tubercular subjects, there is no room for dodging the logical conclusions, that either none at all or but most minute quantities of specific toxins have been absorbed during the course of the disease, or that the toxins which have been absorbed and have caused fever are entirely different from the specific substances contained in tuberculin, or are obtainable from the bodies of the germs themselves.

In leaving the subject of fever in tuberculosis, I wish to say that my studies as here outlined are by no means concluded, but they have reached a stage which seems to justify me to at least invite others to reconsider the heretofore accepted views.

THE COUGH.

Cough is a reflex act, usually due to stimulation of the superior laryngeal or some other branch of the pneumogastric. In pulmonary tuberculosis, the cough is most frequently produced by irritation of the sensitive mucous membrane of the respiratory tract, chiefly that of the bronchi. This irritation may be due to formation of tubercles, ulceration involving the mucous membrane, presence of excessive or acrid secretions, and incidentally to congestion of the bronchial mucous membrane and inhalation of irritants.

THE COUGH IN THE EARLY STAGE. The truly early stage cough corresponds to the first formation of tubercles within the lungs. Their most frequent seat is in the alveolar and infundibular walls, where according to the number of tubercles there is a corresponding number of minute centres of inflammation, which induce catarrh of varying degree. When with deep respiration the alveoli are rapidly distended and again emptied, the catarrhal secretions present may thereby be caused to enter the supplying bronchioles, and thus cause cough, the occurrence of which under such circumstances may be suggestive, if not diagnostic of tubercular lung disease.

If the alveolar catarrh extends to the bronchioles, or if the mucous membrane of the latter is the seat of tubercle formation, independent of, or in connection with an eruption in the alveoli, more constant cough will naturally result, and will continue unless the tubercular process becomes healed or latent, when the catarrhal symptoms and the cough will disappear.

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(1) In this connection I should state, however, that old, very chronic cases of phthisis show a very slight degree of toleration, evidenced by the fact that the extreme sensitiveness to the tuberculin test, as we see it in the early stage of tuberculosis, is usually not present; such cases requiring several times greater trial doses, to cause a fever reaction.

In all those cases, however, in which the alveolar catarrh is slight, and the secretions are not sufficient to enter the bronchioles, there is no cough in the truly early stage, and in such a tubercular deposit may form, become limited, latent, encapsuled, and may heal without the patient's having either cough or expectoration, or experiencing any other symptoms referable to the lungs.

Cough therefore if present in this stage is due to catarrh in the alveoli or bronchioles, or both. When the alveolar catarrh is slight, there may be no cough, or at most it is only increased by deep respiration in connection with severe exercise, laughing, talking, etc.

When the bronchioles are involved in the catarrhal or in a tubercular process, the cough is usually more frequent and, in exceptional cases, it may become quite severe or even violently paroxysmal. While still dry and unavailing, the patient has paroxysms of coughing lasting five, ten or more minutes, during which his face becomes congested and breaks out in a sweat, an intermission occurring only after a little clear mucous is finally discharged, or after the patient is relaxed by vomiting, or the irritability of the nerve centres is diminished by exhaustion.

COUGH IN THE ADVANCED STAGE. If the disease progresses without an intervening latent period or if after such a period destructive changes in the tubercular tissues take place, we enter upon that phase of pulmonary tuberculosis, which is more properly designated pulmonary phthisis, and in which cough is one of the most constant symptoms, but as in the early stage, its frequency and severity stand in close relation to the bronchial catarrh, ulceration, dilatation, etc.

The pathological changes in the bronchial mucous membrane increase in extent and degree with the advancing disease. With the discharge of liquefied, caseous material into a bronchus, the mucous membrane becomes irritated and inflamed, and its increasing secretions form the vehicle for the cavity contents. The cough is then attended with expectoration in which tubercle bacilli and elastic fibres are found.

Inasmuch as the advent of this stage is frequently caused by intercurrent bronchial inflammation, the result of cold or influenza, measles, etc., we often have symptoms of common acute bronchitis preceding the phthisical changes, and there may be no period of dry cough between the initiation of softening and the outward discharge of the cavity.

(TO BE CONTINUED.)

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ORIGINAL CONTRIBUTIONS.

THE NECESSITY FOR ISOLATION AND HOSPITAL CARE FOR POOR CONSUMPTIVES.

BY J. C. WILSON, M. D., PHILADELPHIA, PA. *

Twenty-five years ago Reuhle, a famous physician of Germany, Director of the Medical Clinic at Bonn, wrote concerning pulmonary consumption the following words: "The importance of laboring to check the spread of this deadly disease and to diminish the number of its victims has never seemed to be so urgent as at the present time, when there is a growing demand for more attention to the preservation of health and when the conviction is gaining ground that this is the main function of medical science."

How true these words today; yet the learned writer, in his elaborate article upon "Pulmonary Consumption" in Ziemssen's Cyclopedia, immediately added: "It were idle to suppose, much more to reasonably expect, that we shall ever be able to extirpate consumption from the human race."

Fortunately for mankind this gloomy prediction has, with advancing knowledge, lost its impressiveness. In 1882, seven years later, Robert Koch made known to the world the actual cause of the tuberculous diseases, including pulmonary consumption, in the tubercle bacillus. This discovery marked a new era in medical history. With it bacteriology assumed an established position among the medical sciences. With it the mystery that surrounded pulmonary consumption came to an end. Doubts and uncertainties remained and still remain, but the matter passed from the region of uncertain hypothesis to that of scientific fact. Pulmonary consumption ceased to be an unknowable scourge due to manifold, adverse, obscure conditions, and presented itself in the simple aspect of a chronic infection caused by a definite pathogenic principle, transmissible from individual to individual.

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* Read at a Joint Meeting of the Philadelphia County Medical Society and the Pennsylvania Society for the Prevention of Tuberculosis, January 10, 1900.

As this view concerning the nature of the disease became more clear the three great stumbling-blocks which stood in the way of the advance of knowledge relating to the disease were destroyed. These were, first, the doctrine that pulmonary consumption is essentially hereditary; second, that it is incurable; and third, that as a scourge of the human race it is ineradicable.

The medical profession is in the position today to assert: First, that the disease, except under rare and unusual circumstances, is not hereditary, and that in point of fact the vast majority of cases arise in consequence of infection by the tubercle bacillus, that is to say, the transmission of the exciting cause of the disease from the sick to the well. Second, that the tuberculous diseases, including pulmonary consumption, cannot in the present state of knowledge be regarded as incurable, but that a majority of the cases are, if seen early and placed under favorable conditions, amenable to treatment and capable of being restored to health; under these circumstances the individual case ceases to be a focus or source of infection. Third, it naturally follows that the tuberculous diseases, which cause one-seventh, or 14 per cent. of the deaths in the civilized world, might by the general enforcement of proper sanitary regulations be stamped out or at all events enormously restricted in their prevalence. Facts familiar to the student of medical history in regard to the plague in Western Europe, to leprosy in the British Islands, and to typhus fever justify this assertion. There are those who will address you tonight who not only believe that pulmonary consumption and the other tuberculous diseases might be ultimately stamped out, but who are even sanguine enough to hope that this blessing to humanity might be brought to pass during and constitute the crowning achievement of the coming century.

I cannot say that I wholly share in this sanguine expectation, but the time has arrived when the civilized world should be aroused from its apathy in regard to the subject.

The individual suffering from pulmonary consumption becomes a focus of infection and in a very definite way. Whether the case be acute or chronic, so soon as necrosis of the lung occurs—that is, so soon as ulcerative processes develop—tubercle bacilli are thrown off with the sputum. This organism is practically an obligate parasite, growing and developing freely within ranges of temperature not very greatly exceeding that of the bodies of animals, and requiring moisture and oxygen. Nevertheless, outside of the body it preserves its vitality and capacity for new growth under favorable circumstances for a considerable period. While the expectoration remains moist or when it is discharged into vessels containing water it is innocuous, for the conditions in which the expectoration in the moist form is conveyed to the interior of the bodies of susceptible individuals are exceedingly limited. When, however, the expectorated matters are allowed to dry in handkerchiefs or upon the clothing of the patient, or upon the floor of the room which he occupies, they are ultimately converted into particles of dust, and floating in the atmosphere are inhaled by other individuals in the vicinity. These are familiar facts. They of themselves suggest practical measures of prophylaxis. The people must be taught that the disease is a transmissible one, and that in the vast majority of instances transmission is indirect by means of particles of dried sputum containing the tubercle bacilli and floating as dust in the atmosphere. They must be taught that the chief measure of safe-guarding those in the neighborhood of the consumptive consists in the collection and destruction, preferably by fire, of the sputa. They must be taught that the disease is not necessarily an incurable one, but, that if taken in time, a majority of the cases, probably a large majority, are amenable to treatment. They must be taught that it is better for a man suffering from a beginning consumption to give up his work and place himself under proper conditions to be cured than to struggle on, working until he breaks down beyond hope of cure. The consumptive in the mill, in the factory, in the office, in the school, in the sweat-shop, in the church, in public places of amusement and recreation, and in his home is a menace to the health of those surrounding him. He infects localities, he renders the atmosphere in which float the dried particles of his expectorated matter baleful.

The period of incubation of pulmonary consumption is often a long one. It is rarely possible to trace the direct connection between the infecting sick person and the well person who receives the infection; hence arise difficulties that surround the question of transmissibility. But the closer the matter is studied the less important these difficulties become.

It is more than useless to teach the people, especially the working people, the facts concerning the spread of tuberculosis and not to point out the remedy. It is cruel.

The remedy is a very obvious one. It is based upon the simplest principles of preventive medicine. It demands the fulfilment of a public duty. State and local governments provide and maintain institutions for the care of the poor and especially for the care of the sick poor. But the consumptive of the laboring classes, when he most requires help for himself and safe-guarding for the public, is usually neither sick nor poor. Before long he is both, and the cause of sickness and poverty in others. Then he is commonly past help. At no time is the almshouse or the general hospital the place for him. Asylums are provided for the insane, in order that the curable cases may be properly treated, the incurable suitably detained and society protected against the violent or homicidal. The danger from the lunatic at large is an episode; that of the consumptive a scourge. Hospitals are established for contagious diseases, incidentally that the sufferers may be cared for, primarily for the protection of the people and the prevention of epidemics. The welfare of the people has made it right to throw around these institutions and those who are proper subjects for admission to them the protecting arm of the law. Yet the consumptive, whose need is sorer as his number is greater, turns in vain for help. If in any great community smallpox or diphtheria or yellow fever were to prevail to the tenth part of the ordinary number of cases of consumption, depopulation would at once take place; the people would not stay. Among well-to-do persons the danger is comparatively slight. Education, refinement, decent ways of living are a safeguard. Such people can avail themselves of travel, of health resorts. For them long journeys and favorable localities are practicable. They can go to Goerbersdorf, Falkenstein, Nordrach. For them the regular supervision of competent medical men is possible—constant attention, proper diet, courses of medicine, treatment in emergencies, hygienic conditions, agreeable surroundings. For the poor consumptive all these are wanting. For him only the daily struggle to the end, and disaster not only to himself but to those about him. The establishment of special sanitariums to which the incipient cases can be sent, and special hospitals for advanced cases, is the solution of the problem. Cases at the curable period should be sent to such institutions—not on commitment, but voluntarily—since in such a plan only is hope—hope for him and for those around him. The earlier he is to go the greater the hope of cure. There are difficulties, but they are not insurmountable. Such institutions can be built in any climate, in any well-drained upland locality. There are sentimental difficulties, but those will lessen as knowledge increases. We cannot exalt the feelings of the individual above the safety of the community. The question of arrest of earning power is a difficult one. But the incipient case in many crafts can still work in the sanitarium, and new methods of insurance covering such cases are to be thought of. If we are to arrest the progress of this great scourge, special institutions for the care of tuberculous diseases in the working classes and the poor, at all stages of the disease, are an imperative necessity.

THE WORK BEING DONE THROUGH PRIVATE CHARITY IN THE CASE OF THE CONSUMPTIVE POOR.

BY THE HON. W. N. ASHMAN, PHILADELAHIA, PA. *

Manifestly this question cannot be literally answered. Of the benefactions which pass directly from the individual giver to the individual recipient no record is kept, and no estimate can be ventured. The only field from which statistics may be gathered is that covered by organized agencies, and as these are endowed and largely maintained by individual donors the figures which set out their work may very properly be put under the head of private charity. It is not a matter for congratulation that the showing for Philadelphia is startlingly meagre.

The deaths from consumption in this city head the mortuary list in every year. For ten years ending in 1891 the total deaths from all causes were 209,257; from consumption 27,478, a rate of more than 13 per cent. For the year 1898 the deaths from consumption were 2590, nearly 11 per cent. of 23,790, the total mortality.

The majority of the victims must have come from the ranks of laboring people and from the very poor, because we know that exposure to the weather, insufficient clothing, indifferent food, and crowded and unsanitary lodgings and work places are the weapons with which this disease does its deadliest work. Instances have come under my personal observation where from one or more of these causes young persons upon whom the support of a family has temporarily or perhaps permanently been cast have contracted a cold which would have yielded to rest and careful treatment. But rest meant the stoppage of wages and famine in the house, and even if rest were possible there was absolutely no institution in Philadelphia, outside of the almshouse, where these unfortunates could be cared for. I am thinking just now of a young girl, who had been tenderly reared, and whose family, by reason of the disability of the father, were forced to practice the small economies of the poor. She was employed as a saleswoman in a store, and earned for a person of her years large wages, every cent of which went religiously to the maintenance of the home. To save car-fare she walked to the store on

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* Read at a Joint Meeting of the Philadelphia County Medical Society and the Pennsylvania Society for the Prevention of Tuberculosis. January 19, 1900

a stormy morning and stood with wet feet all day behind the counter. She was taken ill, and when friends called to see her they found that although her home had the aspect of neatness and refinement, it was without food or fire. Aid, of course, was given, but it was given too late. Hundreds of tragedies like this are enacted in our midst every winter, and it seems as though no accessories were wanting to darken their plot. Under the conditions just described the disease, according to all medical testimony, is contagious, and when it gets a foothold is not likely to be content with a single victim. The result is simply appalling. It represents not only the demoralization which springs from hopeless suffering and poverty, but also a positive loss to the community by the withdrawal of a host of wage-earners who otherwise would contribute to the public wealth. Its very worst feature is a moral one, that all the evil could be ameliorated and much of it prevented if the proper appliances were provided.

There are only three institutions in the city of Philadelphia whose specific purpose is the treatment of consumption, and I am glad to say that their object is distinctly charitable.

The oldest of these is the Home for Consumptives (popularly styled the Hospital for Diseases of the Lungs), which is located at Chestnut Hill, connected with which and forming a branch of the charity is the House of Mercy for Male Consumptives, located at 411 Spruce Street. During the year ending April 15, 1899, the inmates in the Home for Consumptives numbered 110, of whom 36 remained at the close of the year; in the House of Mercy 45, of whom 10 remained; and 43 were treated at their own residences. The institution, for it is, properly speaking, one charity, is conducted by the P. E. City Mission. It was organized in 1877, and in twenty-two years has treated 2613 poor consumptives, a yearly average of 119 patients.

The next in order of time is the Rush Hospital, an incorporated charity which has been in continuous operation for eight years. Its grounds front on Lancaster Avenue and on Thirty-third Street. In 1895 it treated 49 resident patients; in 1896, 62 patients; in 1897, 62 patients; in 1898, 66 patients, and in eleven months of 1899 (its fiscal year ending January 31, 1900), 93 patients. In 1899 a wing was added to the original building, giving a capacity for forty beds. Two of these are endowed, for which the hospital has a trust fund invested of $10,000, the gift of two generous benefactors. Its dispensary department has furnished medicine and treatment to hundreds of outside patients.

The third of the charities referred to is the Free Hospital for Poor Consumptives. This is the corporate name of a society, which has no building of its own, but which aims to provide hospital treatment in existing hospitals, or in a hospital to be built, for the consumptive poor. It was incorporated in 1897, and in that year secured admission in hospitals for seventy-six cases, each of which was treated for an average period of nine weeks. The cost to the society exceeded $5000, and the hospitals selected were St. Agnes' Hospital, St. Joseph's Hospital, and Rush Hospital.

With the exception, so far as known, of St. Agnes' Hospital, which has been already referred to, these three institutions fairly represent the quantum of free hospital treatment given to the consumptive poor of Philadelphia. Of course, their work is supplemented by that done through the dispensaries of other hospitals and by noble agents of beneficence, of which the sick diet kitchens of the P. E. Mission and the Society for Organizing Charity are types. But these charities, either singly or collectively, do not profess to furnish the rest, food, and medical attendance which the nature of the disease imperatively demands.

The case stands thus: In 1898 2590 persons died in this city of consumption of the lungs, and only 297 patients were inmates of the hospitals for consumptives during a fraction, certainly not amounting to six months, of that year. That this method of relief is wholly disproportioned to the extent of the evil is not, however, the fault of the wealthier classes of our population, because these have shown by many and munificent benefactions that they regard their abundance as in some sense a trust fund for the welfare of the needy. The simple explanation is that the magnitude of the evil has not been brought home to their consciousness. A few weeks ago a gentleman, in handing to the treasurer of the Rush Hospital the sum of $5000 for the endowment of a free bed, remarked that he had never known what consumption actually was until the death of his wife from that disease a few months before. Yet her last hours were soothed by all that the resources of wealth and affection and professional skill could furnish. I would not if I could picture the gloom of the sick chamber where the watchers are unable to procure the trifling delicacies, the medical aid, or even the bare comforts of life for the stricken member of their household. What the charities just named have done is as nothing compared with what they can do and what they will do if their hands are strengthened. We are all agreed that a State sanitarium for the care of consumptives, to be located with a special view to climatic conditions, is a necessity, but we are equally convinced that a hospital devoted to that class of sufferers is as truly a necessity in every large city. This truth has been recognized and acted upon in every great capital of Europe. The city of London has six special hospitals for consumptives, one of which—Brompton Hospital—is known over the world. The establishment of a similar charity in the city of Philadelphia would be a fitting monument with which to mark the close of the century.

LATENCY OR CURE OF PULMONARY TUBERCULOSIS.

BY KARL VON RUCK, M. D. ASHEVILLE, N. C.

When in the course of the earlier stages of pulmonary tuberculosis the patient becomes free from the accompanying symptoms; when he has lost his cough and expectoration, or if, from the scant mucus which he may still raise, the formed elements have largely disappeared, and tubercle bacilli are not found therein; when there is no marked disturbance in the body temperature, and the patient has regained his lost weight and has returned to a satisfactory degree of strength and general well-being, he is perfectly willing to accept such a result as a cure, and the attending physician feels that he has accomplished all that could be hoped for and is inclined to classify such a result at least as "an apparent cure."

Even if the local examination shows the continuance of physical changes, such as percussion dullness, rough, harsh or bronchial respiration, or if cavernous symptoms are present, all active manifestations having subsided, these local evidences can be assumed to be the result of fibroid transformation of previously present tubercles and of inflammatory products, and since such fibroid transformation, if it really exists, may properly be considered the usual and most common mode of cure, how is the physician to know that such an inference is justifiable, and that nothing lurks behind liable to cause a new outbreak in the future?

It is a common experience, that pulmonary tuberculosis may exist in a latent form for months and years, during which the patient may enjoy entire freedom from symptoms. Indeed, the great majority of patients who consult physicians on account of pulmonary tuberculosis for the first time are such, in whose lungs a latent deposit has become active, signalizing as a rule the initiation of softening, or the advance of destructive changes, in some area, of the affected lung.

When such softening of caseous tubercles is not extensive, with its final outward discharge, the symptoms may again subside; the patient improves, grows stronger and increases in weight; cough and expectoration as well as fever diminish and may disappear entirely; but we would not feel ourselves justified if we called such a patient even "apparently cured."

Neither are physicians in the habit of accepting such results as cures, when they occur independent of treatment; only if the patient has undergone some kind of medication, or if the favorable change coincides with a sojourn at a climatic resort, are they likely to do this.

This is natural enough, for few physicians believe in spontaneous recoveries from pulmonary tuberculosis, especially not after symptoms such as accompany the liquefaction and outward expulsion of caseous tubercles have been present; but when they have prescribed some favorite remedy, specific perhaps, or otherwise, or if climatic change with or without treatment has been adopted, and when under such course the amelioration or subsidence of symptoms is observed, it is the belief in the efficacy of the means employed, that causes the acceptance of such results.

Most of such patients have been tubercular for a long period of time, and but for an incidental exciting cause, such as bronchial inflammation due to cold, grippe, measles, whooping cough, etc., they would probably have continued in the previous latent stage for an indefinite time.

Should such a case present itself for examination before destructive symptoms have set in, and, finding evidence of apical dullness, harsh, rough or bronchial respiration, we would justly be considered rash if we diagnosed a cured tuberculosis in the abnormal area, and the like appears to me to be true if after the outward discharge of a caseous center the former latent stage has again been resumed.

Thus it happens that one physician discharges a patient cured or apparently cured, and his next door neighbor, being consulted, makes the diagnosis of pulmonary tuberculosis, and proposes that this same patient undergo treatment for his evident disease. In other words, the usual examination does not enable the physician to distinguish between a latent deposit of tubercles, which is a source of danger to the health and life of the possessor, and a fibroid area, obselete as far as tubercles are concerned, and which represents the remains of a healed or cured tuberculosis from which the patient has nothing more to fear.

Even the pulse and temperature do not necessarily show anything abnormal in the latent disease, either before softening and expulsion, or subsequent thereto, especially not when only a small focus has undergone the latter change.

How, then shall we know that patients in whom we find the physical signs and phenomena of structural change spoken of are objects for solicitude and care by reason of a latent disease, liable to become active and then to threaten his life? Or by what means can we assure ourselves that there is really a healed lesion only, upon the finding of which we might congratulate the patient that so fortunate a result has obtained in his case?

The former view would require us to earnestly impress the patient with the necessity of doing all that is possible to eradicate and cure his disease in this most favorable period, and before serious advances and complications have taken place. It would justify us to demand from the patient large social and often pecuniary sacrifices, to say nothing of the anxiety to the patient and his family which such a diagnosis implies.

Finding a healed lesion only we might congratulate our patient or ignore it, as we saw fit, but, nolens volens, we must take one or the other position, unless we choose a third one, which is by no means uncommon, and say "that there is a little weak spot in the lung," and keep the patient under observation until, perhaps quite unexpectedly, the truth reveals itself by the advent of destructive processes and the finding of tubercle bacilli in the sputum, a position which deprives the patient with a latent tubercular deposit of the best chance to save his life.

In all such cases we can obtain, as a rule, quite satisfactory and trustworthy evidence by a properly applied tuberculin test, and the relation of a few cases so tested by the writer may illustrate its value and advantage under the circumstances mentioned.

Case 1. The patient was sent to Asheville by her physician to pursue climatic treatment, and during eight months' stay she lost her slight hacking cough and regained her general health. She consulted me as to the propriety of returning home, stating that she felt perfectly well. Her temperature and pulse were normal. Physical examination showed slight percussion dullness in her right upper lobe, and in the left upper lobe posterior I found harsh inspiration; bronchial expiration was present in front above both clavicles; rough and interrupted inspiration existed to third rib in front on the right side; no rales, nor crepitation were found.

Tuberculin test: 2 mgr., followed by temperature 101.1-5 F.; also by local reaction, evidenced by appearance of rough inspiration on the left side in front to the second rib and by distinct crepitation upon coughing, in first and second interspaces of the right side.

Contrary to my advice, she returned home and spent thereafter four months in Europe, where her visit was cut short by the occurrence of haemorrhage. On her later return to Asheville I found extension of the disease on both sides and a moist cavity in the right upper lobe.

Case 2. Consulted me under like circumstances as Case No. 1, but withheld from me the fact that he had been treated during his stay in Asheville with a specific serum and that he had been discharged as cured. Slight cough and expectoration still persisted and the temperature showed small rises toward evening, otherwise the patient's condition appeared satisfactory.

Tuberculin test: 5 mgr. This was followed by a rise of temperature of 2.5° F. above the maximum of the previous day; cough and expectoration increased; tubercle bacilli were found in sputum; locally the reaction was well marked.

Case 3. Patient had been sent to Asheville four years prior on account of "weak lungs." During his stay he had no symptoms. Had a slight shade of dullness in right apex with bronchial expiration. Patient appeared in excellent physical condition, the pulse and temperature were normal; he had received no treatment.

Tuberculin test: 5 mgr. No reaction. Repeated one week later with 10 mgr, "no reaction;" and one month thereafter 20 mgr., no reaction. Patient has had no symptoms since, though for the last three years he lives in New York in active pursuit of his business.

Case 4. Treated by myself in 1897 for three months with purified tuberculin; discharged, at his request, greatly improved. Returned in like good condition the following winter and free from all symptoms of cough, expectoration and fever. Tuberculin test: 5 mgr.; fever reaction of 1.5° F.; local reaction in lungs and in larynx.

Case 5. Treated in 1896 for four months with antiphthisin and purified tuberculin; discharged "apparently cured." No return of symptoms excepting a loss of seven pounds within the last three months; no other symptoms, local condition of lungs unchanged as compared with examination on discharge.

Tuberculin test: 10 mgr. eleven months after first discharge, showed fever reaction 3° F. only doubtful local reaction.

Case 6. Treated in 1897 with purified tuberculin two months and with Watery Extract of Tubercle Bacilli three months; discharged as "apparently cured." Patient had no symptoms since; local condition same as on discharge.

Tuberculin test fifteen months after discharge: 5 mgr., no reaction; 20 mgr. ten days later, no reaction. Patient continues in good health.

Case 7. Treated in 1898 with Watery Extract of Tubercle Bacilli; discharged "apparently cured." Visited Asheville last July, eight months after discharge. No return of symptoms; locally conditions same as on last examination. Tuberculin test: 10 mgr., no reaction;

one week later1-2 mgr. Tubercle Bacilli Extract, no reaction. Continues in good health since.

Case 8. Discharged by his physician as cured; consulted me to confirm the result. Physical examination and temperature, as well as sputum, suggested otherwise, but patient insisted on a tuberculin test, which was made with 1-10 mgr. Watery Extract of Tubercle Bacilli, to which a decided fever reaction (2.2° F.) occurred.

Case 9. Treated in 1898 with Watery Extract of Tubercle Bacilli two and one-half months; discharged "apparently cured." Visited Asheville five months later for examination. Examination showed no change in lungs. Patient had increased six pounds in weight; temperature normal; no other symptoms.

Test with Watery Extract of Tubercle Bacilli 1-10 mgr., fever reaction 1.6° F.; doubtful local reaction.

Case 10. Patient treated in 1898 with Watery Extract of Tubercle Bacilli; discharged "greatly improved," with request to return for examination and further treatment if needed.

Re-examined seven months later. No change in lungs from previous record. Patient had since lost cough and expectoration entirely; feels well; has gained several pounds in weight.

Tuberculin test: 10 mgr., no reaction; one week thereafter 5-10 mgr. Watery Extract, no reaction. Patient has continued well.

Case 11. Treated in 1897-1898 with Watery Extract of Tubercle Bacilli; discharged as "apparently cured." Re-examined seventeen months after discharge; no change in lungs; patient in good health, free from all symptoms.

Tuberculin test: 10 mgr., no reaction; one week later 1-2 mgr. T. B. Extract, no reaction.

Case 12. Patient treated in 1898 with Watery Extract of Tubercle Bacilli; discharged greatly improved, slight cough and expectoration continuing, the latter still contained tubercle bacilli; locally a small, still moist cavity; general condition good; no fever.

Examination five months after discharge; lung condition same, but cavity shows less moisture and has contracted; no fever; still some slight cough and scant expectoration; few tubercle bacilli in degenerated form.

Test with 1-2 mgr Tubercle Bacilli Extract, no reaction.

Case 13. Patient sent to me for treatment on account of lung disease. Had taken a cold a month prior and was still coughing; had lost several pounds in weight. History shows that patient had a haemorrhage fifteen years ago and was at that time in bad health for several months, but has had no symptoms in the interval. Temperature and pulse normal. Physical examination of chest showed well marked dullness in right upper lobe to second rib in front and posterior to spine of scapula. Bronchial prolonged expiration in this apex; nothing else.

Sputum examination negative. Test with 2-10 mgr. T. B. Extract, no reaction. After a short stay patient lost her cough and expectoration entirely and returned home. Continues in good health since.

Case 14. Patient was sent to California on account of lung disease five years ago. On his return to his home in Connecticut he stopped en route to consult me. States that he has been in good health for four and one-half years past and actively pursuing his profession. Temperature normal; physical examination of chest gave apical dullness on both sides, bronchial expiration on right, weak respiration on left side.

Test with 1-10 mgr. Tubercle Bacilli Extract: Fever reaction 2°; local reaction in left upper lobe, where inspiration has become sharp and rough and is accompanied with fine crepitation.

In most of these and many other cases it was only by the use of the specific test that I could determine the question of latency or cure.

Case 9 had been discharged by me five months before as apparently cured. It was an early stage case and all symptoms had disappeared, and yet this patient reacted unmistakably to 1-10 of a milligram of T. B. Extract, although nothing was found in the lungs to justify such an expectation, and he had gained in weight. Without the test nothing further would have been deemed necessary, at least at that time.

Case 5 showed a decided fever reaction to tuberculin after having been discharged by me eleven months before as apparently cured, and, apart from the loss of seven pounds in weight, there was no reason to doubt the permanency of the result.

On the other hand, cases 7, 10 and 11, tested five, eight and seventeen months respectively after discharge, showed no reaction to full test doses, which confirmed the assumption on their discharge, that a recovery had been attained, and case 12 would indicate that, although there was still an open and discharging cavity on his discharge, which had not become dry or obliterated when the test was made, the patient is free from tuberculosis, and that the cavity may be expected to represent simply a result of previous destructive processes and will eventually heal out.

It is obvious, however, that cases which have been treated with tuberculin preparations cannot properly be tested at the time when the treatment is discontinued, and when the patients have become accustomed to much larger doses than are employed in the specific test, enough time must intervene between the cessation of the treatment and the test so that the acquired toleration will be lost.

For this purpose six months might be considered a sufficient interval, case No. 9 having reacted to 1-10 mgr. of Watery Extract with which he had been treated five months before. I have also observed that when in cases under treatment the remedy is suspended for even a few weeks the patients usually react, unless the previously tolerated doses are greatly reduced.

In several instances of this kind, when the patient's treatment had been intermitted for several months, it was found necessary to begin again with the initial small doses, the same as though they had never been treated at all.

In all such cases, however, which are not treated with the view of direct immunization with tuberculin preparations, the physician believing his case to have been cured can apply the tuberculin test before discharge.

Such a course, I hope, will prove valuable in our advice to patients regarding their future course, and it will enable us to judge with accuracy as to the results we obtain from treatment, whatever the method may be.

REVIEW OF CURRENT LITERATURE.

BIRCH HIRSCHFELD'S DEATH AND HIS RECENT IMPORTANT CONTRIBUTION TO PHTHISIOLOGY.

Birch Hirschfeld, for many years professor of pathology in the Leipsic University, whose death occurred at the close of the past year, was enabled before his demise to complete and publish an important contribution to our knowledge of tuberculosis.

His original article appeared in the Festschrift of the Celebration of the Centennial Anniversary of the Leipsic Medical Clinic (Deutsch. Arch. f. Klin. Med. Bd. 64).

The aim of the author was to determine beyond reasonable doubt the primary lesion of pulmonary tuberculosis. In a historical resume he indicates the great disparity in opinion which has always obtained among authorities upon this subject. The incipient lesions usually studied by pathologists have been much too far advanced to enable us to distinguish between what is primary and what is secondary. The author therefore based his study upon a special series of cases in which the infection was of the most minimal and isolated character recognizable. Cases of this sort could occur only in naturally robust people, having vitality sufficient to curb the infection before it could cause secondary foci. These individuals had invariably died of some acute disease, or result of accident, so that the tuberculous lesions found were of the type known as chance discoveries. Had these patients lived, there could be no doubt that the existence of this disease would not have been suspected. Had they lived for years to die of some malady of old age, minute and indifferent cicatrices might have been discovered in the apices. But as a matter of fact, death accidentally occurred at a period very soon after infection, as the author was occasionally enabled to demonstrate with reasonable certainty. Autopsy material to correspond with these conditions must necessarily be very scarce, and many years were required for the author to accumulate the thirty or more cases upon which his study is based.

Birch Hirschfeld believed that he had shown beyond the possibility of doubt that the primary lesion of consumption is an ordinary tuberculous ulcer occurring in the wall of a medium sized bronchus.

In a small proportion of cases the initial lesion was seated interstitially and under these circumstances he admits that it was doubtless of hematogenous origin; but the typical bronchial ulcer in the other cases was plainly contracted from inhaled bacilli.

In the great majority of instances, the infection occurred in a branch of the so-called "posterior apical bronchus." Whereas formerly the entire apex was regarded as a predilection site for the development of phthisis, the author shows that that portion of the apex which is tributary to the ramus apicalis posterior, is the actual area of minimum resistance. While the apex proper sustains an adequate degree of ventilation and interchange of gases, the limited section already mentioned constitutes what the author terms the "dead expanse" of lung tissue, doubtless because it is in relation with immobile structures such as the vertebral column and vertebral extremities of the ribs. On that account this part is hindered in its expansion and contraction, and when infectious dust enters it, it is almost certain to be retained. Owing to the absence of a strong inspiratory current, the tubercle bacilli never reach the air cells and are deposited in the medium sized bronchi, usually at the point of ramification into finer branches. The affected bronchus becomes occluded and the air cells beyond it undergo atelectasis and atrophy.

The pathological alterations up to this point constitute primary tuberculosis of the lung, and the author believes that most cases of phthisis begin in this manner; yet so rapidly and so manifold are the forms which they thereafter assume, that the actual initial stage of the disease has hitherto escaped recognition.

BOVINE TUBERCULOSIS.

The recently published report of the Ohio Agricultural Experiment Station furnishes an idea of the good work which is being done in the United States toward the eradication of tuberculosis.

The report states that an animal may be, to all external appearance, in perfect health, with sleek coat and increasing weight, and yet be far advanced in tuberculous disease. The great value of the Tuberculin test is then emphasized and minute instructions are given in the technique of its successful employment. The standard dose is 2 c. c of Tuberculin for each 1000 weight of animal. If an animal shows an apparent reaction we must eliminate the possibility of sexual heat and approaching parturition, as well as of emotional disturbance.

As to the question whether tuberculin can produce a febrile reaction in the healthy, the report is affirmative, if the dose is excessive, and points out that it is the small amount which possesses a diagnostic value in tuberculosis; the claim that tuberculin might under some circumstances cause the lesions of tuberculosis, is repudiated as a popular bugbear which has long since been dispelled.

The report then considers in full the histories of thirty-eight animals in an infected herd. In two cases an apparent tuberculin reaction was not confirmed by autopsy. In a number of other cases, whether from acquired tolerance or other cause, the reaction failed although the animals were tuberculous. It was learned that a reacting animal might be successfully fattened and its meat saved in cases in which the disease was incipient; in other words, the warning of the reaction gives the breeder a chance to redeem himself from total loss. A number of countries permit the unrestricted sale of such meat when it is free from tuberculous lesions. Germany alone requires that such flesh be always boiled and its tuberculous origin indicated. We now know that the flesh of a tuberculous pig constitutes a much greater menace than the beef of an infected cow. Once a pig becomes contaminated, generalization is much more rapid and thorough.

It is interesting to know that mediaevally enacted laws are still on the statute books of Italy and Spain which prohibit the use of tuberculous carcasses for human food; and Dr. Law claims that these old laws are actually in force at the present time, showing that public opinion has for centuries undergone no alteration in these two countries. In some more progressive lands the doctrine of heredity ousted this primitive belief, and through its general acceptance has operated for years against sanitary progress.

Many data are given which illustrate the relative frequency of bovine tuberculosis, and the casual connection between cases of disease in mankind and animals.

Replies from many practitioners are given in response to circular letters of inquiry asking for evidence as to the source of the virus in cases of tuberculosis in children and adults. One result of sending out these questions is the evidence, that in cities many nurslings contract tuberculosis, while in country practice this particular cause of mortality is almost unknown.

Although a large part of this Ohio report is made up of extracts from contemporaneous bulletins of other experiment stations, it contains much original matter. Perhaps the most valuable lesson to be learned from this report is, that the small farmer or fruit grower, who keeps one good cow for his own needs, is not menaced by bovine tuberculosis. His cow and his children are alike exempt from exposure of this sort. On the other hand, city milk coming from large dairy herds, both the children who drink the milk and the herds are exposed to infection.

TUBERCULOSIS OF THE EYE.

Pechin (Gaz. Hebdom. de Med. et de Chirur. Jan. 28th, 1900) has prepared an elaborate memoir upon the subject of ocular tuberculosis with special reference to the localization of the disease in the iris and ciliary body. He first inquires as to the reason for the obscurity which obtained for so long a period in this phase of opthalmology. For example the description given by Desmarres in 1847, of syphilitic tubercles of the iris would perhaps apply in part to tuberculous lesions. In a later edition the same authority described tubercles of the iris in lepers, which were most likely due to an associated tuberculous infection. In 1868 Gradenigo of Venice laid down rules for the recognition of tuberculous iritis. Pechin reproduces a case reported by this author in extenso, and styles this report a medical classic. The patient was a sufferer from generalized miliary tuberculosis, most of the organs of the body being implicated in the process. The case was clearly the first of its kind to be properly authenticated, although numerous opthalmologists had described lesions which undoubtedly belonged in this category. Pechin cited 11 observers beside Desmarres who had made imperfect contributions to the subject before 1868, beginning with Saunders in 1811.

Since the report of Gradenigo numerous well authenticated cases have been placed upon record, and authorities now recognize two types, one mild, and the other severe, suppurative and destructive. To these may be added a rare glaucomatous form recently described by Lubowski, together with other rare varieties observed by Denig and Michel.

Tuberculosis of the iris is an affection of childhood and youth. It is most frequently seen between the ages of 5 and 25 years. It has exceptionally been seen in the nursing period on one hand and in people in middle life on the other.

Statistics from various opthalmological clinics appear to show that this disease is one of the rarest known, but such a conclusion may be premature.

The pathology of ocular infection has been much discussed; some regard cases of this sort as examples of local inoculation of healthy subjects, claiming that the bacillus lodges at first in some minute lesion of the conjunctiva, or that it even penetrates that membrane without an artificial point of entry. Numerous cases of alleged primary ocular tuberculosis have been reported, but it is not explained by what means the bacillus is able to penetrate the dense sclerotic, nor are there sufficient evidences given of the absence of tuberculous lesions of other organs.

Lagrange removed an eye which was the seat of destructive tuberculous disease from a child aged 7 years otherwise in most robust health, and cases like this are not uncommon in literature. Denig collected notes of 68 cases in 1895, and of this number 41 patients appeared to be in perfect health aside from the ocular lesions, while the remaining 27 were suspected of being tuberculous subjects. In following up these cases Denig ascertained that sooner or later 39 of the 68 developed tuberculosis, although at first but 4 were actually known to be infected elsewhere than in the eye.

Pechin, however, is sceptical as to the occurrence, except in rare instances, of primary ocular tuberculosis, and states that beyond doubt the eye lesion must be secondary in by far the greater number of cases.

This he believes to be shown both experimentally and clinically; common experience teaching us that primary infection most commonly occurs in the lungs, intestinal and mesenteric glands, etc., and that a localization in the eye as a rule succeeds to a primary infection in the structures just named. Therefore when we appear to have a case of primary ocular inoculation in a healthy subject, it is more rational to assume that the original seat of the disease is a small quiescent focus in the lungs or bronchial glands.

Von Duyse was enabled to demonstrate this association by the results of an autopsy, and there is abundant clinical evidence that tuberculous iritis may follow tuberculous osteitis, coxalgia, lupus, etc. Coppez has reported an instance in which a surgical tuberculosis or inoculation-lupus of the hand was followed by an infection of the iris.

Clinically tuberculous iritis or iridocyclitis (for the entire uveal tract is usually involved) may assume a variety of forms. In acute miliary tuberculosis or tuberculous meningitis, we may find disseminate miliary nodules; under ordinary circumstances circumscribed isolated nodules occur which may or may not lead to destructive changes. In the author's experience iridocyclitis presents at first small translucent nodules which may disappear to be replaced by others. This process may continue until resolution sets in or the anterior segment of the eye is destroyed. Plastic iritis usually co-exists and synechiae may then result. Occasionally we have the large so called, "solitary tubercle" of the iris (which however may be accompanied by a few ordinary miliary granules). This lesion is not usually accompanied by iritis, and appears like a pure neoplasm. It is probably the same affection as that described by von Graefe and Virchow under the name of granuloma of the iris.

In high degrees of tuberculosis of the iris, the anterior chamber may be filled with caseous masses and hypopyon may co-exist, and as already stated, the course pursued by tuberculous iridocyclitis may vary between the widest limits.

Recovery may take place spontaneously, the tubercles being reabsorbed with residual atrophic points upon the iris. On the other hand this tendency to resolution may be completely lacking, the nodules may increase in size and the process may extend in all directions; the cornea and sclera may be involved and become perforated at the sclero-corneal junction; the suspensory ligament, the hyaloid membrane and vitreous body may be invaded. While the benign self-limited form is indolent, this destructive variety is extremely painful, and is known to be especially common in children.

Although it has generally been admitted that the ocular tension is lowered in tuberculous iridocyclitis, Lubowski has recently described a case of veritable glaucoma which was associated with the disease in question. Clinically the case was one of acute, absolute glaucoma, and only after enucleation of the eye was the tuberculous nature of the affection revealed.

Finally Michel and Denig have described a variety of disease in which tubercles of any sort cannot be recognized clinically, and the principal symptoms are those of simple inflammation of the ciliary body and iris with opacity of the lense which at a later time amounts to a veritable cataract.

The termination by spontaneous and complete recovery, authenticated by many able observers, is at first sight deemed to be one of the most singular truths of pathology, but does not actually represent anything which may not occur in a number of other organs. The fact that this favorable termination may be fully watched by the naked eye constitutes its sole claim to singularity.

In making a diagnosis the solitary tubercle must be differentiated from syphilitic gumma and sarcoma. Otherwise eyes may be enucleated for supposed sarcoma which might perhaps have been spared. There is also a simple form of granuloma of the iris which follows injury or disease of the cornea, and several rare affections of the anterior chamber may simulate the solitary tuberculous nodule. Cases are also on record which show that rheumatic iritis, panophthalmites and glaucoma have been confounded with ocular tuberculosis.

With regard to treatment, the operation of enucleation has been greatly abused, considering the partial tendency of the disease towards resolution. Nevertheless for obvious reasons, this affection cannot safely be left to itself.

Iridectomy is advocated as a compromise; good results having been obtained, the author especially counsels this form of interference in solitary tubercle. In the disseminated miliary form all operative procedures are contra-indicated.

MULTIPLE STENOSIS OF THE SMALL INTESTINE, OF TUBERCULOUS ORIGIN.

Erdheim (Wien. Klin. Wochensch. Jan. 25th, 1900) calls attention to the fact that up to 1896 Hofmeister was able to collect notes of twenty cases of multiple tuberculous stricture of the intestine, and adds that this number has since been increased to thirty-two. Eisenhardt found eight single strictures and one double one in 566 cases of intestinal tuberculosis.

The present author has had the good fortune to see five cases of multiple tuberculous stenosis; in four of these the small intestine alone was involved, while in the other the ascending colon also participated. Cases of this latter type have occasionally been reported, especially of the associated localization in the coecum and small intestine. When the small intestine alone is involved, the process is essentially latent, because the soft, still liquid chyme is able to pass even a relatively tight stricture with the aid of the intestinal hypertrophy which co-exists. In the colon, however, where fecal matter is present and is of a much firmer consistence than chyme, the stenosis may offer an effective resistance. Thus in Litten's case there were no less than six strictures of high degree in the small intestine, the intervening gut being dilated into stomach-like sacculations, yet during life there were no symptoms whatever of obstruction. In such cases it may occur that the numerous tuberculous ulcers in the intestine cause the contents of the latter to be even thinner than normal.

A study of reported cases shows that as a rule they come to be operated on at a late period. The first appearance of the colicky pains is usually attributed to a simple intestinal catarrh, and this mistaken diagnosis may extend over months and years. A special hindrance to arriving at a diagnosis is the difficulty in palpating the intestines. Obrasztoff has recently devised a new method to meet this impediment, which is based upon the fact that the lower portion of the ileum, which is the principal seat of tuberculous ulceration, possesses a short mesentery, and should therefore be palpable toward the lesser pelvis. This method is unknown to most physicians, and demands much practice.

Erdheim describes his five cases in succession, of which we give two to serve as examples. Patient No. 2 was a woman, aged 47 years, who for a long time had suffered from colic and irregular bowels. For eight days before consultation she had passed neither faeces nor wind. General condition poor. Marked tympanites with visible peristalsis. Abdomen too sensitive for satisfactory palpation and percussion, but a distinct resistance was encountered in the right iliac fossa. A diagnosis of acute coecal obstruction was made and a laparatomy was undertaken, under Schleich's anaesthesia. The strongly inflated small intestine forced itself into the field of operation. There was a hard, adherent tumor at the beginning of the colon, while the rest of the large intestine was collapsed and empty. Two cicatrizial strictures were present in the lower portion of the ileum. An entero-anastomosis was made between the ileum and colon. The patient passed wind and faeces in the night, but nevertheless collapsed and died on the following day. The autopsy showed tuberculous ulcerations and multiple strictures of both the ileum and ascending colon. One of the stenoses above the coecum had finally closed completely and thereby produced the acute intestinal obstruction.

Another case in which only the small intestine was involved was that of a woman aged 27. She had had slight haemoptysis two years and again six months ago, but no further symptoms pointing to phthisis. At about the date of the first haemoptysis a gastric catarrh and violent diarrhoea set in; the abdomen became tense and painful; vomiting of food remnants took place almost daily and colicky pains occurred occasionally. Physical examination revealed undoubted evidence of phthisis pulmonum, commencing or latent. The abdomen was tympanitic with visible active peristalsis; these symptoms have continued in varying degrees to the present time.

A diagnosis was made of progressive tuberculous stenosis of the small intestine, and this opinion was confirmed by laparotomy when two annular strictures were found in the ileum. An entero-anastomosis between ileum and colon was established. The patient made a good recovery and remained in fair health for a time, when the old symptoms began to reappear, perhaps from new strictures above the anastomosis.

Commenting on his cases, Erdheim states that all were examples of secondary infection, with antecedent pulmonary tuberculosis. With regard to the all important question of diagnosis of multiplicity, he says that Krogius made out a three-fold stricture in his case because three tumors could be recognized by palpation. Sklodowski states that peristalsis is manifest for a long distance above the stricture, while tetanic rigidity is present immediately above the obstruction. It would therefore follow that in multiple stricture, several spots of this tetanic rigidity should be palpable.

IDIOPATHIC PRIMARY MILIARY TUBERCULOSIS OF THE SKIN.

Nobl (Wiener Med. Presse, Jan. 15th, 1900) reports a case of this very rare condition. It must be remembered that typical miliary tuberculosis affecting the skin occurs so infrequently that an authority like Kaposi has seen less than two score of such cases, and that even of this small material the great majority were examples of auto-infection in highly tuberculous patients, so that the practical importance of this infection is usually considered small.

In a primary case like Nobl's, however, the interest is considerable; in the absence of other evidences of tubercle, a differential diagnosis between the lesion in question on one hand and epithelioma or syphilis on the other, is almost a clinical impossibility.

Various forms of primary inoculation tuberculosis are sufficiently common, but these types of disease bear no definite relation to true miliary tuberculosis. Deposits of miliary nodules which later become confluent and undergo in succession caseation, necrosis and ulceration, are practically the rule in most other tissues, but they are rare exceptions in the skin, so that the latter organ possesses almost total immunity to typical infection, and in the latter's stead we have such apparently hybrid affections as lupus vulgaris, lichen scrofulosorum, etc., etc., which represent tuberculosis plus some unknown factor.

This case of primary infection agrees with many of the secondary recorded cases in having its seat about the buccal orifice. A young man of possibly tuberculous stock, but himself robust, was attacked with a troublesome and painful vesicle on the lower lip which became a nodule and, after enlarging somewhat, broke down and ulcerated. The resulting ulcer had the characteristics described by Kaposi and others of essential miliary tuberculosis of the skin, although bacilli could not be found in the discharge. The lesion was destroyed by the actual cautery, and at a later period there appeared about the cicatrix outlying miliary nodules which pursued a course like the parent lesion and were similarly destroyed. A histological diagnosis of tubercle was readily made. To the best of the author's belief, the patient was free from any associated tuberculosis or other infection. The mode of infection and the source of the virus could not be even surmised.

HUMAN TUBERCULOSIS WITHOUT KOCH'S BACILLUS.

Courmont (Bericht ueber den Kongress zur Bekaempfung der Tuberculose als Volkskrankheit 1899, p. 243) states, that true tuberculosis is almost always due to Koch's bacillus; in rare cases, however, all the phenomena of the disease may be caused by germ life which is quite distinct from the micro-organisms just mentioned. This so-called pseudo-tuberculosis is much more in evidence in animals than in mankind. Kouskow, Hayem and Charrin have reported cases of tuberculosis in which Koch's bacillus was absent, and was not apparently replaced by another micro-organism. The author, Du Cazal and Vaillard, Hayem and Lesage, and others, have found veritable tuberculous disease from which bacilli other than Koch's were cultivated, and animals therewith successfully inoculated. Two unpublished observations are appended. The first case investigated by the author and Nicholas was in a female aged 28, with pulmonary and laryngeal phthisis of four months' duration. The patient died and there was never any question of diagnosis either before or after death. Guinea pigs inoculated with bits of tuberculous tissue died promptly of generalized tuberculosis, indistinguishable from typical cases. A bacillus could be cultivated, and when cultures were inoculated, typical tuberculous lesions were caused. Nevertheless, the germ in question was certainly not Koch's bacillus, nor could the latter be anywhere discovered in the tissues. The anomalous micro-organism most resembled the bacillus of pseudo-tuberculosis of guinea pigs, yet there could be no doubt that it had originated in the human subject.

The second case occurred in a man aged 30 of tuberculous antecedents, who had been ailing several years. The diagnosis was "left pulmonary tuberculosis." Koch's bacillus was, however, not found in the sputum. When the latter was inoculated into animals they died of sepsis. Patient died of uraemic bronchitis. Autopsy showed a number of tuberculous lesions affecting the bones and axilliary glands as well as the lungs. Histologically tuberculosis was evident, but Koch's bacillus was not to be detected. Bits of diseased tissue inoculated into animals caused the lesions of typical tuberculosis. A bacillüs was cultivated from the tubercles, and cultures of it caused specific lesions in animals. A careful study of this germ showed that it had points of resemblance to the bacillus of pseudo-tuberculosis of guinea pigs, from which, however, it differed in some respects.

Curiously enough, the author does not appear to have tested this case with Tuberculin, which would doubtless have been the best method of determining whether or not the morbid process was actually tuberculous. In the recent Leprosy Congress statements analogous to those of Courmont were made about the bacillus leprae. One reporter claimed that in a small number of cases the bacillus, usually so abundant, was totally absent in the lesions. Against all such negative and paradoxical findings should be opposed the positive results of many expert bacteriologists who have never failed to demonstrate the presence of the micro-organisms when sufficient pains and time were devoted to the task.

TUBERCULOSIS OF THE FEMALE SEXUAL ORGANS.

In the recently issued Festschrift in honor of Professor Schauta, the distinguished Vienna gynaecologist, there is an article by Dr. Lucius Stolper upon the above subject which is discussed from the standpoint of pathological anatomy and diagnosis. The memorial to Schauta is contained in the January number of the Monatschrift fuer Geburtshuelfe and Gynaekologie.

The foundation of our knowledge of tuberculosis of the female genitals was laid by Hegar some 15 years ago, and since that period considerable progress has been made in this field.

The author's material consisted of numerous alcohol preparations of known tuberculous organs with the genitals of a number of women found in autopsy to have been tuberculous in the lungs or some other locality. This anatomico-pathological basis was furnished by Professor Weichselbaum. Clinically this contingent was reinforced by numerous cases from Schauta's clinic, and from specimens removed intra vitam.

Microscopical study was made of the tubes, uterus, ovaries, cervix and vagina. The total number of cases studied was 36, and all of these women had some form of tuberculosis. In nine individuals (25 per cent.) the microscope detected tuberculosis somewhere in the genitals.

From the details of the analytical table we note that Case 6 represented a woman with extensive pulmonary and peritoneal tuberculosis, in whom the tubes, ovaries and uterus were involved in the specific process. The participation of the genitals had not been recognized clinically. Case 1 was affected with extensive pulmonary visceral and meningeal tuberculosis. Clinically the diagnosis of endometritis post abortum was recorded, but no suspicion of its tuberculous nature was expressed. The autopsy, nevertheless, revealed miliary nodules in the uterus and tubes. Case 21 had extensive pulmonary and glandular tuberculosis and incidentally chronic tuberculous salpingitis and ovaritis. These examples may serve to illustrate the nature of the majority of all cases and we see that these lesions of the genitals usually represent little more than chance discoveries of the autopsy room, apparently not to be distinguished during life from simple affections of these organs. It appears that as a rule the ovaries, tubes and uterus are involved in common and that the principle point of interest is to determine whether the process is an ascending or descending one. The former is much the more infrequent of the two. There are many ways in which bacilli may reach the vagina through the stools of an infectious diarrhoea, coitus, infected sponges, syringes and other objects, but the vaginal secretion furnish an unfavorable soil for localization. The author thinks that three of his nine cases may have been of the ascending variety. In one of these (No. 29) the lungs and viscera were normal, and there was every evidence that the tuberculosis was primarily in the uterus or tubes, and that the peritoneum was infected by extension from the genitals.

The descending form of the disease is much more common and less obscure in nature, because it is easily seen, both in theory and in fact, that a tuberculous peritonitis might and often does extend to the tubes and thence downward along the genital tract. However, as we have just seen, the converse may occur, so that it is not always easy to determine whether peritonitis is the first or last step in the process. Authorities hold opposing views as to the frequency of extension of a tuberculosis of the peritoneum into the tubes. Some would explain the great frequency of peritonitis by propagation from the tubes, while others, like the late Birch Hirschfield, hold that the usual order is, first peritonitis and then salpingitis.

The present author's careful work appears to show that in his limited material peritonitis was usually secondary to pulmonary phthisis, and that when the tubes were involved this occurred as a rule from extension from the peritoneum. Six at least of his nine cases appear to be of the descending variety.

In dealing with his material from a clinical standpoint, the author refers to that singular affection known as esthesiomene of the vulva, and says that he has no doubt whatever that it is a typical tuberculous ulceration which may or may not have the character of lupus and that the formation of fistulous tracts and polypoid excrescences has confused the medical practitioner as to the real nature of the disease, which often passes for syphilis or epithelioma; Viatte, Winckel and others, by the demonstration of bacilli, giant cells, caseation, etc., having settled the position of this affection in nosology.

Tuberculous ulcers have been encountered in the vagina, from the introitus to the fornix. These have either possessed the character of mature lesions, with sharp, undermined edges, or in certain cases miliary nodules, still discrete, have been seen in the act of breaking down. A third or fistulous form of vaginal tuberculosis has been described by Daurios. Still the vagina possesses a high degree of immunity to this disease, as it does to gonorrhea and other affections. Undoubted primary tuberculosis in this locality has been recorded but once or twice. In descending uterine tuberculosis the vagina is involved only through a prior complication of the bladder, or rectum, so that it is attacked from without and not by direct extension from within.

With regard to the cervix, it has been claimed repeatedly that a primary ulcer in that locality was unknown, but Friedlaender finally described an undoubted example. A primary tuberculous tumor, however, is known to occur in the cervical portion, in which proliferation and metaplasia of the epithelium occur, and even at times a concentric, onion-like arrangement of the latter in nests, so that the disease bears histologically a marked resemblance to cancer. However, in examining a section of tissue removed for diagnostic purposes, an erroneous conclusion can readily be prevented.

When the uterine body is the seat of the disease, there may be no objective manifestations to facilitate a diagnosis. In other cases we find more or less enlargement with evidences of caseous metritis. Most authorities recognize three types of disease of the corpus, viz., miliary, interstitial and ulcerative. Since most instances of uterine tuberculosis are of the descending variety, we naturally find that the fundus is the part most extensively involved.

Tuberculosis of the tubes and ovaries is sufficiently common to be fairly well known to the practitioner, and a consideration of this localization is therefore omitted.

Stolper concludes with a brief practical section on diagnosis. In not one of his nine cases was the nature of the process suspected during life. He nevertheless advises repeated examination of secretions and scrapings for bacilli. In theory we ought to have secondary implication of the inguinal glands in tuberculosis of the vulva and vagina. However, a tuberculous ulcer anywhere from the vulva up to and including the vaginal portion of the cervix ought to be diagnosticated by ocular inspection alone, but localizations of the disease in the corpus uteri interstitially, and in the tubes and ovaries cannot be recognized with certainty during life.

TUBERCULOSIS OF THE MUSCLES OF THE ABDOMINAL WALL.

Hiller (Beitraege zur Klinischen Chirurgie, Bd. XXV, Heft III) states that in 1863 Virchow denied the existence of tuberculosis of the muscles, but that seven years later Zenker recognized that such a localization could occur. Numerous cases have since been reported, chiefly of secondary tuberculosis, the infection having been propagated to the muscles from bones, joints or glands. It was originally held that the only possible form of primary localization in muscles was part of a general miliary tuberculosis.

In 1886 Habermann and Mueller reported, from v. Bruns' clinic the first known case of primary tuberculosis of muscular tissue. Lauz and de Quervain in 1893 analyzed the entire subject with especial regard to the different muscles which have been known to participate in the primary or hematogenous form.

Hiller, having had an opportunity of studying a case of primary tuberculosis of the abdominal muscles, finds that his is the seventh known case of this localization. The first, according to Hiller's judgment, was reported by Barot in 1801. A fluctuating tumor in the groin was taken for a psoas abscess, but proved to be an idiopathic cold abscess of the muscles. A study of the remaining cases shows that they are essentially of the same type as Barot's.

Analyzing the seven cases the author concludes that the abdominal muscles are somewhat more prone to primary tuberculous infection than are other muscular structures. The tendency of the tuberculous deposit to proceed to suppuration he looks upon as characteristic. In one case the process was sufficiently diffuse to have been regarded as a myositis tuberculosa. In the case of Lauz and de Quervain suppuration had not yet taken place, the lesions consisting of firm, white nodes with caseous centers.

TUBERCULOUS MOTOR POLYNEURITIS.

Decroly recently reported to the Societe Belge de Neurologie what was probably an example of this affection (Jour. de Neurol. Jan. 20, 1900).

The patient was a man aged 23. Two years earlier he had become affected with pulmonary tuberculosis, which, however, was considerably improved at the time of writing, but the patient was still emaciated.

When he entered the clinic for the first time he was unable to walk or stand without the aid of a cane. The muscles of the hands were almost as much shrunken as in cases of progressive muscular atrophy. The muscles of the feet and legs were paralyzed; there was also paresis of the thumbs. The paralyzed muscles gave the electrical reaction of degeneration. It was apparent that the muscles supplied by the external and internal popliteal and median nerves were the seat of the atrophy and motor insufficiency.

Paralytic symptoms had developed suddenly, within three or four days, and were accompanied by severe pains and tenderness on pressure in the affected nerves. A diagnosis of polyneuritis was therefore made. Numerous similar cases in literature made reasonable the conclusion that the neuritis stood in relation to the tuberculous infection.

RUPTURE OF A TUBERCULOUS GANGLIONIC ABCESS INTO THE AORTA, LEFT BRONCHUS AND OESOPHAGUS.

Brodier and Lecene report a unique case with the above title from the clinic of Professor Potain at the Charite Hospital, Paris (Arch. Gen. de Med. Feb., 1900).

The patient was a man of 50 who had been well up to three months before admission. His principal symptoms were paroxysms of intense pain in the chest with suffocation. During the periods of quiescence there were dull pains over the chest. About two weeks before admission almost complete aphonia set in.

Repeated physical examinations led to no diagnosis. There occurred soon after admission a copious escape of blood per os, but its source whether from the respiratory or alimentary tract, was not determined. The character of the painful and suffocative crises impelled the patient to thoughts of suicide. He died a natural death, however, two weeks after admission in the midst of profuse attacks of haemorrhage from mouth and nose.

The autopsy 32 hours after death showed on the internal surface of the arch of the aorta, at the point where it overlaps the left bronchus, a perforation which led into a large cavity having cheesy walls and containing bloody fluid and caseous pus. It was readily seen that this cavity also extended into the left bronchus, the ulcerative process having laid bare the cartilaginous rings. The oesophagus itself communicated with this cavity by its anterior surface. The recurrent nerve traversed the excavation, but the vagus ran clear of the latter. Two caseous glands of the size of a walnut were seated above the aortic arch. They belonged to the chain of ganglia which accompany the recurrent nerve and run along the trachea. Numerous tubercle bacilli were found in the tissues of the glands and in the contents of the cavity.

The authors conclude from the analogy of the findings in their case with the ganglionic tuberculous cavities of children, originally described by Gueneau de Mussy, that the condition present was a tuberculous abscess which had originated in the bronchial glands.

A most striking feature in this case was the fact that the lung tissue was entirely free from evidences of tuberculous infection.

EXPERIMENTAL MENINGEAL TUBERCULOSIS.

With a view of throwing some light upon the tendency of meningeal tuberculosis to occur in such notable variety of anatomical and clinical forms, Sicard has undertaken an experimental study upon dogs (La Presse Medicale, Feb. 7, 1900,) with the following conclusions:

It is possible to produce disseminated meningitis experimentally by way of both the blood and cerebro-spinal fluid. The lymphatic system heretofore regarded as playing a part in the mechanism of infection of the meninges, is in reality non-participating, save that in disease of neighboring cavities (eye, nose, ear) leucocytes may possibly, by their migration along the lymph channels, carry infection to the cerebro-spinal fluid. In the great majority of cases experimental tuberculous infection caused a diffuse process over the entire pia mater; in a few exceptional cases a discoid or focal form was produced.

The author thinks that the toxins secreted by Koch's bacillus play an important role in the occurrence of meningitis and that the cerebro-spinal fluid is an essential factor in the dissemination of the bacilli and the toxins.

In the course of a generalized meningeal tuberculosis, the cellular lesions of the subjacent nervous tissue serve to explain the motor symptoms observed during life, and in extradural tuberculosis, medullary lesions due to compression may be associated with direct bacillary infection.

The exudate and granulations on the surface of the pia mater are not due to mixed bacillary infection, for Koch's bacillus and its toxins are capable of producing all the essential manifestations of the disease.

CURABILITY OF PULMONARY TUBERCULOSIS.

Professor Curschmann read a paper with this title before the Berlin Congress last May. He stated at the outset that he was to deal with the question of curability rather than that of prognosis, which latter was a more comprehensive topic.

For evidence as to a favorable termination the author cites the cumulative results of innumerable autopsies since the days of Laennec which teach us that resolution of apical lesions is very common. Not all such residua are specific, however, and a further distinction must be made between foci which represent absolute recovery and others which merely denote latency. The author believes that complete resolution of an undoubtedly tuberculous focus is a very infrequent phenomenon; in other words, "cures" are incomplete and relative in the majority of cases.

From the clinical standpoint we are justified in predicating recovery when local physical signs have either totally disappeared or, what is more common, give evidence of terminal atrophy in situ, the general health being fully recovered at the same time. Clinical experience teaches us that such recoveries are practically complete, although in theory we may have no better result than a condition of latency as often borne out by the autopsy. However, in the great majority of cases of recovery, tuberculosis was never suspected during the patient's life. If we admit that absolute recovery is very rare, and that most of such cases are recognized only by accident in the dead-house, it becomes evident that for practical ends we must assume some other standard of recovery to conform to the large and ever increasing number of "clinical cures." This can only be obtained by carefully supervised statistics extending over a term of years. Private sanitaria are best adapted for securing uniform statistical results.

In the Hanseatic Insurance Company sanitarium, treatment enabled 697 individuals (65 per cent.) within a stated period to return to work in a condition of relative recovery, of this number 231 had been free from symptoms for one year, 271 between one and two years, 175 between two and three years, and 20 for over three years. The percentage of cases in which the general condition was apparently normal was much greater than that in which evidence of local mischief had entirely disappeared, showing that practically we may have to disregard the local condition in estimating a relative cure.

Of special evidences of relative recovery, failure to take on weight is invariably a bad omen. The more extensive the local mischief and the greater the duration of the disease, the smaller the chance for relative recovery. Other unfavorable factors are mixed infection, presence of tuberculosis in other viscera, association with other diseases, acute or chronic. Of especially bad import are a hereditary taint and the habitus phthisicus. Sex, per se, exerts no influence on curability.

MEDICAL TREATMENT OF TUBERCULOSIS.

Kobert was assigned this subject at the recent Berlin Congress, and his paper was especially novel in scope because of the results of his correspondence with the representatives of special medical and surgical practice for the purpose of arriving at a consensus of opinion with regard to anti-tubercular remedies.

Surgeons and pediatritists who represented an annual material of 12,000 cases believed almost unanimously in iodoform as a valuable adjunct to surgical treatment, the drug being used with glycerine or oil as an injection into diseased bones, joints and glands. The methodical use of green soap was largely advocated in glandular tuberculosis and pleurisy, cod-liver oil and potassium iodide were very generally employed as adjuvants.

Internists, representing an annual material of 30,000 tuberculous cases, made free use of narcotics to soothe the intolerable pains of throat and intestinal tuberculosis. Every sort of opiate, including codeine, heroin, dionin and peronin had been tested. Phosphate of codein was most warmly recommended in intestinal tuberculosis.

Stomachics and artificial nutriments were freely employed, such as cod-liver oil, brandy with egg, cream, sanose, nutrose, etc., etc. Many colleagues, however, repudiated all artificial food products, but Kobert points out that the term "artificial is not justified in the simple preparations like Kason or Tropon, and that as artificial we should designate more particularly those in which the albumen has been digested, like Sanose or Samatose.

Food products which have been artificially digested and represent meat extractives and albumoses are not true nutrients, and act laxatively, they are therefore contra-indicated in all those cases where there is a tendency to loose bowels and particularly so in tuberculosis of the intestines.

With regard to antipyretics there was a similar lack of harmony, perhaps a third of all reporters refusing to employ them. The strongest claims were made for pyramidon.

That the profession believe in expectorants is shown by the fact that eighty per cent. of reporters advocate their use. Ipecac and apo-morphia appear to be the favorites, but a great variety of other drugs are recommended, some for special indications, such, for example, as iodide of potassium, which is much used by the French in the belief that it assists in the elimination of the bacilli.

None of the specific plans, which include creasote and its derivatives, etc., has met with anything like general acceptance. More extensive use is still made of creasote and guaiacol or rather of their derivatives in the form of carbonates, Creosotal and Duotal, which latter preparations are preferred by von Leyden, Cornet and many others to the crude products on account of the caustic properties of the latter, and while no specific effects are claimed they are believed to increase the appetite and lessen expectoration and thus contribute to the patient's general improvement.

Laryngologists and Otologists, representing an annual material of 3500 tuberculous patients, testify that lactic acid is the most popular remedy in tubercular laryngitis, while chromic acid is preferred for the ear. Cocaine and orthoform are largely used as local anaesthetics and boric acid as an antiseptic.

Of disinfectants for rooms of tubercular patients, especially in the light of the results of the recent labors of Fluegge and Ruvner, the final general verdict is that only one substance can be considered, namely, formaldehyd, and that its best and most effectual method of use is with Schering's apparatus, which is preferred to all others.

TREATMENT OF LOCAL TUBERCULOSIS BY INJECTIONS OF GLYCERINE EXTRACT OF COD LIVERS.

Guerder (Revue de Therapeutique, Jan. 1, 1900) has been studying this phase of therapeutics since 1893, at which period he had been much impressed by Gautier's researches into the properties of cod-liver oil.

Peculiar principles and ferments contained in the latter combine to render it far more than a simple animal fat. Believing that an anti-tubercular remedy ought to act beneficially when locally administered, Guerder began by injecting the sterilized crude oil subcutaneously. The results were unpleasant, as pain of a severe type, which persisted for one or two days, was produced.

The author then experimented with a gylcerine extract of fresh cod-livers. As some pain was also caused by this preparation it was diluted with salt-solution, until the injections could be tolerated. This diluted extract he employed both clinically and experimentally. After reporting in detail a series of cases treated in this manner, Guerder sums up the result of his studies as follows:

(a.) Injections of glycerine-extract of cod-livers are harmless.

(b.) Fever, eruptions, etc., are not induced when moderate doses are employed. It is well, however, to begin with small quantities diluted with salt solution.

(c.) The remedy has both a local and general action, the former being much more marked.

(d.) The changes induced appear to be of the nature of phagocytosis, with a tendencency to elimination of tuberculous tissue.

From his results the author concludes that a glycerine extract of cod-livers must contain the active principles of the oil in a more concentrated form, and that practitioners who employ the crude oil internally would do better to inject this glycerine preparation subcutaneously in the neighborhood of the local mischief, whether the latter is a pulmonary cavity or cold abscess.

We quote at random from some of the author's cases. A young woman suffered from marked cervical scrofula including lymphoma of the sub-clavicular glands. External discharge of pus had not yet occurred, but a few points of fluctuation were apparent. Guerder began his injections in the vicinity of these purulent foci, repeating them every eight days; the swelling slowly diminished, and for the first two months suppuration appeared to be held in check. Finally, however, three openings formed, and gave exit to some caseous material; after which the mass diminished in size until only few small separate glands remained. The general condition improved meanwhile, and treatment was suspended. Later the residual glands suppurated and the general condition became poor when the injections were resumed until "resolution" was complete.

In this case, caseation having occurred before the treatment and during the interval in which no injections were used, only a small amount of cheesy material having been discharged, and no other treatment having been administered during the period, the author infers it proper to attribute to this method of treament the reduction of the glandular mass which had been the size of a man's fist.

TREATMENT OF PULMONARY TUBERCULOSIS AT THE VIENNA CLINICS.

Landesmann in his work entitled "Die Therapie an den Wiener Kliniken" Vienna 1900, has the following to say concerning the routine treatment of phthisis.

Codliver oil is used during the winter months; in warm weather iron and arsenic, or mineral waters containing them are substituted.

Superalimentation is insisted upon and milk (boiled) to the extent of three litres per diem is the first requisite. As alternates, Koumiss, somatose, nutrol, etc. Brandy, a teaspoonful every two hours, unless haemoptysis or gastritis is present, is employed.

Creasote or guaiacol is largely used, and may be combined with codliver oil, arsenic, or other indicated medicaments.

Koch's Tuberculin is injected in minimal doses, provided that hectic fever or other evidence of possible associated infection is absent. A rise of temperature from Tuberculin is to be avoided.

If the patient is able to take a climatic cure, creasotal is the only medicament advised, as it may be given uninterruptedly for months, while the dose may be gradually increased without ill effects.

If aspiration pneumonia develops, heart-stimulants (digitalis, alcohol) are given.

For night-sweats, besides the customary mild measures, (vinegar baths, dusting-powders) agaricin or atropine is used.

In diarrhoeas, water compresses to the abdomen, with astringents inwardly, are employed. If ulceration of the intestines has occurred, lactic acid or tannalbin. Enteroclysis with astringents in solution are also used.

For very trying cough, narcotics, balladona, cannabis indica or morphia, are the usual prescriptions.

THE ROLE OF TUBERCULOSIS IN THE PATHOLOGY OF THE NERVOUS SYSTEM.

Dufour (Revue Neurologique, Feb. 15, 1900,) refers in his article to the above subject with the statement that we now possess a fair knowledge of the various forms of tuberculous polyneuritis (motor, sensory, trophic and vaso-motor.)

The first author to describe this affection in a classical manner was Joffry in 1879. Since that date several monographs have been published upon the same subject.

A number of authorities insist that this class of affections shows an essential instability or fugaciousness, even when the localization is diffuse. This generalization applies however only to neuritis, and not at all to sciatica, facial neuralgia, etc., which have also been studied in connection with tuberculosis; these latter affections being always localized to single nerve trunks, and stand in no necessary relationship to neuritis proper.

Independently of the action of the bacillus upon nervous tissues, the toxins are claimed to play a definite etiological role, and the results of experiments by Carrieu and Hammer are claimed to leave no doubt upon the point; but the author suggests that it is probable that the previous occurrences of syphilis or alcoholism predisposes to the toxic action of the products of Koch's bacillus upon the nerves and nerve centers. Fraenkel and others believe that tabes and multiple sclerosis may be caused by tuberculosis, while Klippel has attributed cases of general paralysis to the same cause. Essential neuroses (hysteria, neurasthenias) as well as psychoses, have been studies in connection with latent tuberculous foci and several competent neurologists have not hesitated to affirm their belief in a necessary relationship between the two conditions.

Dufour reports the following case of the painful form of tuberculous polyneuritis, as follows:

Patient, a single woman, aged 30. Father alcoholic, mother neuropathic; of their four children a brother died of pulmonary phthisis. Dufour thinks we have here all the causal elements present: the predisposition or soil furnished by her parents, and the infection derived from her brother. Her occupation caused her to stand, and to ascend and descend stairs, during the entire day.

Six years before, the patient had a right-sided pleurisy. At the time of examination there were dullness and rales over the right apex with numerous enlarged glands in the anterior cervical and sub-maxillary regions; this latter condition dating back 8 years.

The polyneuritis began some two years or more ago. The early symptoms were spontaneous pains in the thighs and calves of the legs, preceded however by painful locomotion. The joints were never involved in the pains.

At times these pains were lightning like, lancinating and excruciating. A symptom of great value in this affection is, according to the author, that the pains are aggravated by muscular efforts. After a period of exertion the pain appears to become sufficiently severe to inhibit further attempts at walking.

In the present case, the lower extremities were the chief sufferers. The arms were only slightly involved. The lateral vertebral and dorsal spinal regions were intermittently hyperaesthetic. There was a slight difficulty in opening the mouth, in no wise attributable to any affection of the temporo-maxillary articulation. Numerous vague symptoms appertaining to the vaso-moter and trophic nerves were also present which presented nothing characteristic.

This patient made an approximate recovery after a sojourn at a thermal resort, and a course of cacodylic acid.

(Polyneuritis in the course of tuberculosis is however a rare affection, and we see no necessary connection with the specific bacillus or its products, more than we can see a casual relation with the rare occurrences of tabes dorsalis, multiple sclerosis or of general paralysis and other psychoses in the course of phthisis.

The enormous frequency of tuberculosis and the comparatively very rare instances in which such affections appear during its course, cannot justify such an inference.

The occurrence of polyneuritis in alcoholics, diabetics and syphilitics, its observation with various forms of poisoning from metals (arsenic, lead, etc.,), its occurrence as a sequela to diphtheria and influenza, or in the course of tabes dorsalis when tuberculosis does not co-exist, and finally its observation when none of these causes can be associated, would to our view, deprive the proposition that its occurrence in tuberculosis must be caused by the specific toxins of the tubercle bacillus, of every logical basis, until it is further shown why, in tuberculous subjects, this toxic effect is so rarely observed, when in all of them the supposed toxic cause is uniformly present.

We have heretofore pointed out the contradictory evidences as regards the production of specific toxins in tubercular subjects, and the role they are presumed to play in the manifestations of the disease.

After a personal use of various tuberculin preparations presumed to represent the specific toxins of the bacillus of Koch, and for several years past of the pure soluble substance of the bacillus itself, no such symptoms as are commonly attributed to specific toxins have been observed to stand in relation to their administration in over 1500 cases who received such preparations in increasing and often in large doses during long periods of time.

Writers on the subject of Tuberculosis frequently take refuge in the theory of toxins for the explanation of almost every symptom that occurs in the course of tubercular disease. Not only this, but a specific predisposition is claimed to result to the offspring of parents who have been exposed to the action of the tubercle bacillus, and its toxins.

Landouzy claims for the presence of toxins in the maternal blood, a blighting influence upon the foetus. Hanot sees in their presence the cause for congenital stenosis of the pulmonary artery, and for the so-called "chlorotic aorta" and for other defects in the vascular system; while according to Mosny, the toxins cause debility of the cells of the foetal organism, to a degree that it is never recovered from and they even effect and profoundly modify the germ cells of either parent that has had tuberculosis.

Fortunately there are those who begin to perceive that this whole theory seems to be destined to terminate in a reductio ad adsurdem, and who point out the necessity of renewed and careful study of the subject. We certainly know that congenital stenosis of the pulmonary artery is not specially predisposing to tuberculosis, that tubercular anaemia bears no relation to true chlorosis, that in experimental tuberculosis the offsprings of successive tubercular parents show no increased predisposition to tuberculosis; and that the vascular changes spoken of do not appear in them nor are such defects more frequently present in the children of tubercular parents than in others.

The loss of appetite, the frequent heart action, the occasional insomnia, the incidental inflammations of the pleura, the pneumonic complications, the fever, the night-sweats, the caseation and liquefaction of tubercles, the occurrence of neuragia, myalgia, and of neutritis, the various degenerations and the tubercular cachexia have all been ascribed to the toxic products of the bacillus which are supposed to be generated in the infected organism; and yet those who use the products of the bacillus cultured outside of the body for therapeutic purposes, and have the largest experience in their employment ever since the first introduction of Koch's crude tuberculin, cannot establish such a relation, on the contrary, the artificially produced toxins appear to have a decided beneficial influence, and none of these various unfavorable changes and symptoms have appeared under their continued use.

Evidently there must be a toxin that forms only in the infected organism, perhaps as a product of secretion or excretion by the germs which cause such serious symptoms, if they are really caused by toxins, and this toxin must differ radically from the products which can be obtained from the artificial culture or by extreating the bodies of the specific germs.

In the large number of cases treated by the writer, not a single instance of polyneuritis or other of the deleterious effects ascribed to toxins have been observed, as standing in relation to the treatment, on the contrary one of the most constant relations between their administration and the heart action, is a decided improvement of the latter, with an almost never failing lowering of the frequency of the pulse, and improvement in its quality.

The occurrence of anorexia, and of disturbances of the nutrition have been conspicuously absent, instead improvement of such symptoms occurred under their use, for the evidence of which we need but point to the uniform increase in weight which, for instance, in the last 78 cases reported amounted for early stage cases, on an average to 9 pounds, in middle stage cases to 13 pounds, and in the last stage 19 out of 21 patients gained on an average 10½ pounds. It is equally so with the temperature, which in all but a few cases grew less, averaging a reduction of about 2 degrees; the pulse rate diminished likewise on an average 17 beats per minute, and like observations are made and reported by other observers.

Assuming that the substances which are obtained by extracting the bodies of tubercle bacilli are toxins, and that they are identical with those that may be generated in the infected organism, the above recorded experience and the additional anamolous conditions with regard to fever reactions when toxins are used for diagnostic purposes, caused the writer to believe, that if any, but very minute quantities of like toxins are absorbed. We can not otherwise reconcile the facts that a person that has been tubercular for years, and has therefore continually produced and absorbed like toxins from his tuberculous lesions should prove even more sensitive to a minute test dose, to which non-tubercular subjects who have never produced or absorbed such toxins, show no response whatever.

Additional evidence for such a view is had in the fact that tubercular or non-tubercular subjects learn quickly to tolerate rapidly increasing doses of the supposedly identical toxins, and that large doses are eventually borne without causing fever, or any other undesirable symptom.

With this practical experience we must either deny the theoretical inferences, that specific toxins are responsible for the many and various symptoms on the part of the nervous, vascular and digestive systems, which are charged to them, or believe that there is a radical difference between the toxins which are absorbed in the course of the disease and those substances which we can obtain from the artificial culture of the tubercle bacillus.—Editor.)

EDITORIAL.

THE CARE OF THE CONSUMPTIVE POOR.

Believing that few of the profession realize how inadequate are the accommodations for this class of sufferers in our public general and special hospitals, we publish Mr. Ashman's paper, which might upon first thought appear to the reader as of only local interest. It is true that he deals only with the conditions as they exist in the city of Philadelphia, yet what is true of the Quaker City in this particular is to a greater or lesser extent true of almost every city in our land. It is indeed appalling to think that in a city with such enormous hospital facilities comparatively so few of the multitude of phthisical persons can receive institution treatment.

We are daily reading of prophylactic measures, in the way of expectoration ordinances, efforts to isolate consumptives by legislation, advisability of regulating marriage of those suffering from or predisposed to tuberculosis, etc., but how little do we hear of steps being taken for the relief of these poor people. Of the few charitable institutions devoted entirely to the care of consumptives, it is a most lamentable fact that a large proportion of them are "homes" without a resident physician, only the very ill ones being under the direct supervision and care of an attending physician; merely comfortable waiting places on the Stygean banks. "At no period should the tuberculous patient be 'kept'; he should always be treated" (Dr. S. A. Knopf).

To-day, when so many are bringing their minds and energies to the protection of the healthy, when so many are generously contributing their funds to general missions, hospitals, libraries, etc., why do so few remember the poor consumptive, who, when no longer a wage-earner, must either become a grievous burden to his family or seek refuge in the almshouse to await the often welcome advent of death?

While the general public is becoming so thoroughly awakened to the horrors and dangers of tuberculosis, why is it so rarely that some generously-inclined person is not moved to consider some means of treating the poor individual?

Probably the greatest barrier to the endowment of special sanitaria for the treatment of consumptive poor is that it is not generally known that the doors of many public and charitable hospitals are practically closed to this class of patients and that general hospitals are ill-adapted to their treatment. Contributory, perhaps, is the very prevalent idea that pulmonary tuberculosis is an absolutely hopeless condition, it not being known that in a large percentage of cases, under proper management, either a cure or arrestment can be effected and the individual again become a productive citizen.

That the task is too great for private charity alone is evident when we consider that the combined number of consumptives in the States of New York, Pennsylvania, New Jersey and Ohio is more than 100,000, representing an annual mortality of 25,000. For the care of such an enormous number of invalids and for the protection of such an enormous number of foci of infection, State assistance is a necessity. It is as much the duty of the State to protect the individual of the commonwealth against the ravages of the "Great White Plague" as against other scourges. In England the mortality has been reduced nearly one-half, and this when the infectious character of tuberculosis was not taken into consideration. Can we, the recognized progressive nation of the world, not do as well?

EDUCATION OF THE PUBLIC TO DANGERS OF TUBERCULOSIS.

It is indeed a matter for congratulation that so many forces have united to combat the dissemination of tuberculosis. While to those already affected with the disease the subject of prophylaxis can have no selfish interest, yet since in the public mind the acquirement of the disease through heredity has been largely displaced by that of inoculation, it must be a source of great satisfaction to know that their progeny are not entirely powerless victims to the hereditary taint. The devoted phthisical mother formerly anxiously asked, "Doctor, will my baby inherit consumption from me?" Now we as frequently hear, "Do you think my baby may have already caught the disease from me?" or, "How can I protect my children?" This is a most valuable indication that the lay mind is at last becoming educated to the danger of infection in this particular condition. When we have succeeded in making the mothers realize that there is a lurking danger for her baby in every consumptive, the sanitarians' crusade against the tubercle bacillus is more than half won.

While much may be accomplished by legislation with a certain class of individuals, we will not have reaped the full benefit of such enactments until we have educated the public mind to a full realization of the fact that the expectoration of the consumptive is an individual menace.

Though the effort of the extremist to isolate and colonize the consumptive is impracticable and impossible of accomplishment, even in his failure he will have done well, for its agitation will force upon the public a realization that there is a danger surrounding every individual in every community.

The active steps being taken in our large cities, New York in particular, to improve the sanitary conditions in the tenement districts, is no doubt having an educational influence which it would be difficult to estimate. The most frequently mentioned danger, indeed one of the most powerful arguments in favor of this laudable reform, is the danger of infection from consumptives. Then, too, in conjunction with this reform is the park movement, which, while it has for its prime purpose the lowering of the mortality among children from those diseases common in crowded districts, also emphasizes the importance of these children having sunlight, good air, etc., in order that their constitutions may successfully combat the tubercular infection from parent or neighbor.

We need more such societies as the Pennslvania Society for the Prevention of Tuberculosis, which, we believe, is a most powerful factor in the education of the community. It has for its avowed purpose the education of the public by the distribution of tracts and readable pamphlets telling how one may avoid contracting the disease, how one may avoid transmitting it to others, how individuals whose places of business are frequented by the public can lend aid in preventing the dissemination of infection.

The society also advocates the compulsory registration of tuberculosis, both in human beings and domestic animals, and the establishment of State sanitaria for the reception and treatment of both incipient and advanced phthisis.

The Brooklyn Pathological Society at its four hundred and eighth meeting devoted the whole session to a consideration of the dangers from the common communion cup. The subject was presented as viewed from the standpoint of the general practitioner, the phthiso-therapist, the dentist, the aurist, the syphilographer, the surgeon and the minister. In the discussions the possibility of this sacrament being the means of the transmission of tuberculosis played an important role, references being made to where tubercle bacilli were actually found in the dregs of the holy chalice. The influence of this meeting can be only for good, for it affects the public through the medium of the ministry, whose opinions will be a most potent factor in the public education. The adoption of the individual communion cup in many of our prominent churches is probably one of the most striking evidences of what is being done towards educating the public mind.

Indeed, it is a signal victory for the sanitarian when the people so far realize the dangers of infection that they are willing to give up the common cup with all its sacred memories and associations.

THE RELIABILITY OF THE TUBERCULIN TEST IN BOVINE TUBERCULOSIS.

During the past two years the public press has published much concerning tuberculosis and, incidentally, much nonsense as to the unreliability of the Tuberculin test in the determination of tuberculosis in cattle. We recall one instance in which six out of forty condemned animals were reported to have been unnecessarily sacrificed. That these animals were apparently free from tuberculosis we are ready to concede, but not that they were actually unaffected simply because no tubercles were found. That such a conclusion can be inaccurate and is illogical we shall try to demonstrate.

The use of the Tuberculin test in making diagnoses in cases of doubtful human tuberculosis finds its justification in the fact that an exceedingly small tuberculous focus may give a positive fever reaction. For diagnostic purposes in cases of extensive tuberculosis the use of the test is, as a rule, not only unnecessary, but bad practice, hence its value depends upon its sensitiveness in small, by ordinary means unrecognizable foci.

This leads us to a consideration of what determines the reliability or unreliability of the test in bovine tuberculosis. Results may be positive or negative:

(a) Positive reaction with positive findings.
(b) Positive reaction with negative findings.
(c) No reaction with negative findings.
(d) No reaction with positive findings.

Those cases giving a "positive reaction" where the post-mortem examination reveals tuberculosis, demonstrates that in some instances Tuberculin does produce a series of phenomena which we are pleased to denote a "positive reaction." They demonstrate so much and no more.

In those cases in which the injection of a proper test dose of Tuberculin is followed by the same phenomena, and in which the post-mortem examination reveals no tuberculosis, can we with equal positiveness say that the injection of Tuberculin sometimes produces a "positive reaction" in non-tuberculous animals? Obviously, we here have a much more difficult proposition confronting us, that is, if we concede the oft-demonstrated fact that a tuberculous deposit the size of a hazelnut may give a positive reaction. Such a conclusion could be arrived at only after a very minute macroscopic, in many instances microscopic, examination of every tissue of the carcass. In experimental tuberculosis we have frequently found a two to four hour task before us when we wished to determine with a reasonable degree of accuracy the absence of tubercles in an animal as small as a guinea pig; then what shall we say of the enormity of the undertaking of an examination of an animal weighing one thousand times as much, where a record of "non-tuberculous" would be justified?

It is, then, self-evident that in order to obtain in a reacting beef sufficient evidence to justify a condemnation of the method, we must devote days of the most diligent search to each reacting animal. In the above noted case, where six animals were reported non-tuberculous, the report having been given out within a week after the test, it is probable that no such thorough examination was made; furthermore, we believe it would be exceedingly difficult to find any such thorough negative examination of a beef ever having been made—on the face of it it would be a practical impossibility.

No fever reaction in an animal where tuberculosis was not found by post-mortem examination would be an equally uncertain support of the accuracy of the test, unless such careful examination, as above indicated, had been carried out.

A negative reaction after the injection of the proper dose of Tuberculin in animals, which were found after immediate killing to be undoubtedly tuberculous, would, we believe, be the only logical basis for the condemnation of the test as inaccurate and unreliable.

It not being absolutely demonstrated that what obtains in guinea pig tuberculosis obtains in tuberculosis of an animal weighing one thousand times as much, it would upon first thought appear that the determination of the fallibility of the Tuberculin test in bovine tuberculosis could not be accomplished except by the complete destruction of hundreds of valuable animals. However, if the test fails very frequently in animals with grosser lesions, the fact could be established without the wanton sacrifice of valuable food meats. Should in one of our larger packing houses every animal be tested before being slaughtered, and the carcasses of all non-reacting animals then be closely inspected as they were being cut up for the market, if the failure was a frequent one, it would not be very long before we would have numerous evidences of the unreliability of the Tuberculin test as ordinarily applied to detect bovine tuberculosis.

Such facts would be infinitely more valuable to the sanitarian than the fact that an occasional supposedly non-tuberculous cow had been condemned. There is nothing so treacherous as resting under a false feeling of security. Did we know that Tuberculin did not always, or frequently did not, detect the presence of tuberculosis, we would be spurred on to seek more certain means of protecting the public against this source of danger.

Let us grant that such an investigation would show that bovine tuberculosis frequently escaped detection by this method and that an occasional animal was unnecessarily killed, would we, in the absence of a better test, even then be justified in condemning its use in the examination of dairy herds? Since it is well established that a majority of the tuberculous milch cows can so be detected, and just that many more sources of danger to the milk consuming individual removed, there can be little question as to the justification of its use.

ORIGINAL TRANSLATIONS. (1)

TUBERCULOUS AFFECTIONS OF THE SKIN. (2)

BY PROFESSOR DR. JADASSOHN, DIRECTOR OF THE DERMATOLOGICAL CLINIC AT BERN.

The honorable task awarded me by the chairman of the Tuberculosis Commission of delineating the present aspect of our knowledge of the relationship between the skin and tuberculosis, is by no means easy of fullfilment. In this territory there are so many moot points that it is necessary to carefully distinguish between that which is certain and that which is hypothetical. I believe I can reach the object assigned me most readily if I first give you a brief sketch of the general etiology and pathology and the well understood and assured forms of cutaneous tuberculosis, and then consider that portion of the subject which is just now being investigated, while the most important questions for the practitioner, prophylaxis and treatment must receive cursory discussion.

Tuberculosis of the skin is just as little a pathogenetic and clinical unity as is tuberculosis of other organs. We now know to a certainty that it may occur through direct inoculation from without, and from matter which is foreign to the organism—exogenous inoculation-tuberculosis; and again that it may take place through matter derived from the body itself—auto-inoculation-tuberculosis—(the consumptive inoculates any itching point upon his body by scratching with the finger-nails, beneath which tubercle bacilli have frequently been found, etc.) Although the skin is evidently less sensitive toward tuberculous infection than many other organs—many portions, such as the hairy scalp, being especially resistant—contributory causes of the most varied kinds may favor the lodgment of the bacillus. Besides the predisposition which we cannot exclude, external agencies doubtless play an important role; for example, the crusts of a chronic eczema may certainly serve as a protecting cover beneath which the bacilli may develop.

In the second place cutaneous tuberculosis occurs as an extension from contiguous parts; a common seat for infection is the mucosa, especially that of the nose, where the conditions are undoubtedly more favorable than on the skin. The tuberculous process having secured a firm foothold in the nasal fossa, it may gradually penetrate to the skin, or may reach it by extension along the nasal duct or the nares; as in gland and bone tuberculosis, the process may extend from the immediately underlying organs to the skin, where the disease may continue after the originally diseased parts have healed.

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(1) Translated for the Journal of Tuberculosis from Verhandlungen der Tuberculose Commission. Berlin, August Hirschwald, 1900.

(2) Read at the session of the Section on Tuberculosis at the Meeting of the German Naturalists and Physicians, Sept. 20, 1899.

Thirdly, cutaneous tuberculosis may be of metastatic origin—from some tuberculous focus within the body the virus may be propagated along the blood vessels to the skin, or the lymphatic system may, without becoming visibly implicated itself, serve as the route of migration.

One might assume that such different modes of origin might correspond to different clinical pictures. This, however, is not necessarily the case. Different forms of the disease may apparently originate in the same manner, and the same clinical condition may arise in different ways. We may, however, lay down a few general rules: lupus and its congener, tuberculosis verrucosa cutis, originate in the majority of cases by inoculation, more rarely by contiguity, this latter method of origin being the rule with scrofuloderma. Certain forms of exanthems, to be described later, have a haematogenous origin.

The clinical picture of cutaneous tuberculosis does, therefore, not depend upon the mode of infection alone, but many other agencies play an essential, though practically an unknown role. The fact that many patients exhibit multiple tuberculous foci having a uniform type suggests the importance of the great individual difference which may exist between the bacillus and the organism which it attacks. On the other hand local conditions also play an important role, as shown by cases in which the most varied forms of cutaneous tuberculosis may co-exist.

We call affections of the skin tuberculous only when they are directly conditioned by the tubercle bacillus. The criteria which we possess to recognize the tuberculous nature of a process are very different both in kind and value. Of the various methods of bacillary demonstration by microscopy, culture and animal experiment, the last named is most readily and frequently applied to the skin. Later I shall have occasion to say that negative results in particular are devoid of definite significance. Purely histological diagnosis has often shown itself untrustworthy (especially in differentiating syphilis); the same thing may be said of the clinical morphological diagnosis. The occurrence of a cutaneous tuberculosis in a patient with actual tuberculosis, or with the disposition thereto, has but a limited signficance. On the other hand, the positive local reaction which follows the injection of

Koch's old tuberculin is a very important and, in my experience an infallible characteristic, which I often employ to advantage in diagnosis and without harm to the patient when due precautions are taken with the dosage.

The processes which we comprise etiologically under the term cutaneous tuberculosis are very varied; the limitations of these various forms are constantly extending. The very different names in use have before all the utility of rapidly indicating the form and significance of the individual affections. They especially designate characteristic modes of evolution within the boundaries of which the majority of all cases may be classed. Nevertheless we must keep in mind that there exist transition forms of the most varied kind, as well as many cases not yet assigned to the recognized clinical province of tuberculosis.

The most important type in practice is tuberculosis luposa, otherwise lupus vulgaris (or tuberculosus). When we speak without qualification of lupus we always mean a form of cutaneous tuberculosis. I shall refer later to a second disease which bears the name of lupus, lupus erythematosus. It is hardly necessary to state in this connection that such a diagnosis as lupus syphiliticus has no longer any justification. We may speak of a lupoid syphilis, or in very rare instances of a combination of syphilis and lupus, i. e., tuberculosis; but a lupus is never syphilitic.

Lupus often arises through inoculation from without, in the skin or mucosa, especially in the nose; it also originates over tuberculous glands and bones, anal fistulae, etc.; and it may appear in multiple foci—especially after acute exanthemata (scarlatina, measles), in all probability through a haematogenous infection. While chiefly a disease of the skin and mucosae, it does not spare bone and cartilage, which it destroys or perforates, especially when originating in the mucosa. It acts in this manner upon the septum and alar cartilages, the soft and even hard palate. It mutilates the fingers and may lead to elephantiasis of the face and extremities and even to colossal enlargement of the nose, as I myself once witnessed. In short, lupus is something more than an "eating tetter." Of more importance to the practitioner than the terminal forms are its modes of debut. These are unfortunately so often overlooked that the best period for successful treatment slips by. Every physician should know how to diagnosticate the primary efflorescence, which is often very difficult of recognition. The classical description of the lupus papule—perhaps better termed macula—is familiar to all: yellowish brown, somewhat translucent, but often red spots, in which the yellow may be distinctly produced only by pressure with a glass slide which expels the color imparted by the blood; if the end of a blunt probe be pressed against one of these lesions, it readily sinks into the diseased tissue and a drop of dark blood appears at the site of the puncture.

It frequently happens that the eruption consists only of one or more of these maculae—lupus maculosus miliaris; this dermatological diagnosis then appears to the practitioner improbable on account of the relative indistinctness of the clinical picture.

From this purest form of lupus there are developed an unlimited number of derivative types and deviations, of which many, like the peripherally spreading form of psoriasis, form soft nodules, of which both the superficial and deep destructive varieties are well known. It is therefore of more importance to indicate some of the more frequently occurring and less typical forms. There is a lupus acneiformis, which exceedingly closely resembles acne, with which it is often grouped by many physicians. In place of a general description, I prefer to sketch a case which I myself have followed up; a robust man—who, however, developed a tuberculous fistula in ano at a later period—presented upon his face certain dark, rosacea-like small papular and peripherally infiltrated efflorescences, which exacerbated in the winter and disappeared in the summer. Old tuberculin gave a positive local reaction, while histologically were found isolated tubercles. Animal experiments gave positive results. This affecton had been designated as acne and rosacea.

Another little known form which I have repeatedly seen in children: firm, smooth, bright red or somewhat darker, elevated placques, with or without scaling, which would most strongly suggest the diagnosis of a chronic infiltrated eczema, was shown after closer study to be a form of so-called lupus sclerosus.

Other cases which are distinguished by firm infiltration and a peculiar livid color, and which have been diagnosticated as so-called lupus pernio, have been shown—through a very characteristic example which I have recently seen—to be cases of genuine lupus.

Many cases of lupus in mucous membranes are very difficult to recognize, particularly when the skin is as yet unaffected. The somewhat glassy, translucent, pale, graular proliferations on the palate and gums exhibit when examined with the probe the same yielding quality as do the lupus nodules in the skin; the lupous uvula and epiglottis may be mutilated, like the lupous nose. But great destruction of the palate, septum nasi, etc., may, in opposition to a widely prevalent belief to the contrary, also occur in pure tuberculosis. Most difficult, perhaps, is the recognition of lupus of the tongue.

Less manifold is a form of tuberculosis ranked by some as lupus, by others as a type sharply distinguished from it, which under the name tuberculosis verrucosa cutis is sufficiently well known—characterized by the warty and horny surface and by the accompanying miliary papules, which, however, are by no means invariably present. This affection is in general more benign than lupus, and is of especial interest because with it are to be reckoned as belonging all so-called examples of "anatomical tubercle", which are actually of tuberculous character. Even more than lupus is this form an inoculation-tuberculosis, with favorite localization on the hands of physicians, dissecting room attendants and butchers, but also of those who are closely associated with consumptives and even of the latter themselves, in case they use the fingers more than the handkerchiefs. More rarely this type of tuberculosis may be found over a tuberculous lymphadenitis or lymphangitis, and most infrequently of all it may appear as I have once seen it—in the form of a disseminated exanthem, composed of warts having a red areola.

That form of cutaneous tuberculosis which is most frequently associated with glandular and osseous tuberculosis is also well known. By the majority it is termed scrofuloderma, and Unna also reckons tuberculous fistula as belonging to the same category. Nodules form more frequently than in the other forms of tuberculous disease of the skin, after the process has reached the surface; they exhibit great variation in size, and soften, break down and form ulcers of irregular shape.

Such nodules, however, may be disseminated through the skin or subcutaneous tissues, especially in children, and may very closely imitate the morphology of syphilitic gummata (gommes scrofuleuses); they may also form in the course of a definitely demonstrable tuberculous lymphangitis, and may further appear in latent tuberculosis of the inguinal glands and in connection with venereal ulceraton of the genitals (many cases of strumous bubo).

If, however, the tuberculous process, instead of merely traveling along the main lymphatic trunks, should follow individual lymph-radicles, there may result (I have seen a case in Kocher's clinic) an elephantiasic thickening of the skin with multiple nodes and papules, which may discharge externally through small fistulous openings.

These forms of colliquation tuberculosis and cold abscesses may also in rare cases originate through cutaneous inoculation. Many points of analogy to these formations are offered by the so-called tuberculosis fungosa cutis, or fungus cutis-nodules often projecting high above the skin, fungoid in character, and found more particularly associated with lesions of the bones.

More than any of the forms already mentioned is the last variety, about to be described, associated with severe tuberculous dsease of the individual. This is the formerly erroneously so-called "essential tuberculosis of the skin," the acute or sub-acute ulcerous miliary tuberculosis of skin or mucosa. It is most frequently found in counsumptives in the neighborhood of the natural orifices (mouth, nose, rectum, genitals). The ulcers have sharp, indented borders, are mostly superficial, and present gray or yellow nodules in the floor or surrounding integument. In contrast to all other forms, tubercle bacilli are here, according to my experience and that of others, readily found. The localization of these lesions appears to speak in favor of the view (which has repeatedly been antagonized) that they are due to an auto-inoculation.

We should, however, be very much in the wrong did we believe that the forms of disease just described exhaust the number of demonstrable tuberculous dermatoses. There still remain a large number of atypical cases which are to be ranked with the precedisg types, either with difficulty or not at all; many inoculation tuberculoses in the form of non-typical, torpid ulcerations (per example those which result from circumcision), or of chancriform efflorescences such as I have seen upon the tongue of a man with commencing phthisis, and which with its smooth surface and firm infiltration might be confounded with a syphilitic ulcus durum; or finally, forms which resemble superficial chancroid or even a varicose ulcus cruris. Above all others, however, there belong here singly disseminated forms, apparently of haematogenous origin, which are very seldom diagnosticated. Small papular and pustular exanthems such as Heller, Leichtenstern and Pelagati have observed in miliary tuberculosis of children, and which by the demonstration of bacilli have been shown to be surely tuberculous; or more tumor-like lesions as seen by Nageli. Here also belongs a case which came under my observation; an elderly woman became affected with somewhat deeply seated subcutaneous, very firm nodes which mostly resembled multiple sarcoma. These lesions grew slowly, became bluish red and underwent at a later period incomplete softening with the establishment of small fistulae—no visceral or other tuberculosis demonstrable; typical histological findings, typical results on experiment animals. In two places miliary lupus foci also developed.

Affections of this sort can hardly be diagnosticated by microscopical investigation.

The subject matter of cutaneous tuberculosis will be still more amplified by combinations with other affections. Erysipelas, especially the relapsing form which not seldom accompanies lupus, is more apt to cause a persistent oedema or an actual elephantiasis than to essentially improve the tuberculous affection. Elephantiasic thickening may also occur without erysipelas, especially in lupus of the lower extremities (through lymph and blood stasis). Tertiary syphilitic lesions can be combined with tuberculosis and very confusing pictures naturally result from this association; proof of the mixed nature of the affection is furnished through the demonstraton of bacilli and the partial healing through anti-syphilitic treatment. Of more frequent occurrence is the transition of lupus and also, as in one of my cases, of scrofuloderma, into a very malignant carcinoma, or the formation of a cicatricial carcinoma in the lupus scar.

Before I leave the subject of actual cutaneous tuberculosis, there should be added a few observations on diagnosis. We dermatologists doubtless prefer to make a purely clinical diagnosis under especially favorable circumstances; we believe that the trained eye can see much which in other departments of medicine must remain hidden, or be arrived at only after great efforts. But we take care to protect ourselves from an excess of confidence in this respect. As tuberculosis imitates other diseases, so may these latter also imitate tuberculosis. I will not speak here of rarities—of lepra, glanders, rhinoscleroma, actinomycosis, pseudo-leucaemia and leucaemia, or of the lately announced discovery of the existence of blasto-mycoses which according to descriptions and illustrations appears to represent a pseudo-lupus. It is syphilis which most frequently makes diagnosis difficult, this disease and tuberculosis being the most polymorphous of all affections which involve the skin. I could adduce an entire series of such cases in which our clinical diagnosis almost necessarily suffered shipwreck, especially for the reason that syphilis can exceptionally give rise to a yielding quality (the typical consistency of syphilides being firm). These lesions occur especially in late syphilis, but they may occur (and this fact is hardly recognized) in the early periods of the disease, and especially when the type is severe and refractory to, but not actually uninfluenced by anti-syphilitic treatment. In such lupoid foci I have found that the histological structure strongly resembles that of tuberculosis—nodules with epitheloid and the Langhans giant-cells. In these cases, however, animal experiments have repeatedly given rise. to negative results. (1) The rare gummata of the lymph-ganglia may after suppuration present a picture extremely like that of scrofuloderma. In the extremities tuberculosis verrucosa cutis and lupus serpiginosus (with spontaneous healing in the centre) may be deceptively imitated by late syphilis (especially the "tubero-serpiginous" form). For a long time we have relied in these case upon the diagnosis ex juvantibus. Of late years, however, various objections have been raised against the employment of this method. Through mercurial treatment and especially injections of calomel true lupus may be made to improve, under circumstances which preclude any error of diagnosis. Personally I have never been able to attain these results. From the published experiences, it is evident that the improvement occurs more slowly in these cases than in early or late syphilis under the same treatment. Potassic iodide, which improves tertiary syphilis with great rapidity, may also be efficacious in actinomycoses (and as has recently been announced in the blastomycoses) (2); but it has no action upon tuberculosis.

It therefore appears that the distinction in practice between tuberculosis and syphilis (as between syphilis and tumors) when made by the employment of specific remedies, as juvantia or non-juvantia, has a significance which while relatively slight is not to be unheeded. ment and reaction of Koch's old tuberculin must continue to be em-Both for the ends of practice and scientific proof, the animal experiployed more and more, and in time will aid us in making an early diagnosis with much greater frequency than is at present the case.

(To be continued.)

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(1) Jadassohn, Einige seltenere Hautsyphilide. III. Internationaler Dermatologen-Congress. London, 1896, page 353.

(2) Hyde, Hektoen and Bevan. A contribution to the study of blasto mycetic dermatitis. Brit. Jour. Dermatol. 1899, July.

SUPPLEMENT TO THE JOURNAL OF TUBERCULOSIS.

In this part the whole subject of Pulmonary Tuberculosis will be covered by a continued series of articles written by Dr. Karl von Ruck. Articles already in print will be revised, and republished, and others will be written new, appearing in the following order.

Article I.—The cause of Tuberculosis, and the conditions which predispose to its acquirement. Article II.—The Prevention of Tuberculosis. Article III.—The Pathology and Symptomatology of Pulmonary Tuberculosis. Article IV.—The Diagnosis of Pulmonary Tuberculosis. Article V.—The Prognosis of Pulmonary Tuberculosis. Article VI.—The Treatment of Tuberculosis, dietetic, hygienic and symptomatic. Article VII —The Climatic Treatment. Article VIII.—The Specific Treatment. Article IX.—Laryngeal Tuberculosis, its diagnosis and treatment. Article X.—Institutions for the Treatment of Pulmonary Tuberculosis.

THE PATHOLOGY AND SYMPTOMOTOLOGY OF PULMONARY TUBERCULOSIS.

(Continued from page 104.)

In such instances in which the destructive changes appear in connection with intercurrent bronchial inflammation the cough continues but usually with some abatement, and a more or less pronounced hectic type of fever which now makes its appearance differentiates the case from chronic bronchitis.

After a cavity has been discharged the cough becomes less troublesome, and, unless other sources of irritation exist, it rarely exceeds in frequency and degree that which is required to expel accumulated secretions.

Other sources of irritation are the presence of pharyngeal or laryngeal catarrh; the inhalation of irritants such as dust, smoke, cold or very dry air; and tubercular or simple erosions or ulcerations of the upper air passages, especially when situated in the trachea or upon the bifurcation of the main bronchi. The latter may cause the cough to assume a most severe character. Cough begets cough, by causing congestion of the respiratory mucous membranes, and when once induced by even slight degrees of irritation, as for instance mouth breathing, during waking or sleeping hours, some patients become nervous and anxious to relieve it by voluntary coughing and thus induce severe paroxysms that yield only after the bronchial congestion is followed by more or less secretion of mucus.

Subsequent intercurrent colds, pneumonias, pleurisies and new foci of softening add temporarily or lastingly to the increase of the cough, but beyond all the local causes there is a great difference between some individuals as to its frequency and severity.

We find patients whose chests are full of moist rales, showing abundant secretions in the larger bronchi, and yet they cough and expectorate but little, and I have observed several who, instead of coughing, simply hawked up the secretions, which appeared to come up in the easiest manner. One of these never coughed at all, although he expectorated from eight to twelve ounces every day. This patient informed me that he had never coughed in his life, and a quick expiratory effort was all he needed to make to discharge large mouthfuls of sputum.

Young people as a rule cough more than do elderly subjects, and those of a nervous temperament more than do the phlegmatic. Cough is often increased in women with the approach of and during the menstrual period, when there is a natural physiological congestion of the lungs which may show itself even in cases where the menstrual function has ceased in the course of the tubercular disease.

Undue physical exertion, an overfilled stomach, gastric fermentation, or gaseous distension of the abdomen, damp weather, reflexes from the nose or ear and pressure upon branches of the pneumogastrics from enlarged bronchial glands or from fibroid induration and retractions of the lung, all may give rise to cough or augment that ordinarily produced by irritation of the respiratory mucous surfaces.

As a rule, most patients become less sensitive to the various sources of irritation as the disease progresses, and with ordinary care for the avoidance of external causes, cough in the advanced stages is usually not more than is required to discharge the expectoration.

Under the naturally diminished reflexes the cough is less during sleep than when the patient is awake, or when on first awaking he changes his position and dislodges accumulated secretions. Many patients also experience a more or less severe coughing spell when they assume the recumbent position.

The morning cough is more persistent and is the last to disappear as the case pursues a favorable course.

With the advent of intestinal complications, especially of colliquative diarrhoea, the cough and the expectoration both decrease, the diarrhoea seemingly having a derivative action upon the bronchial and cavernous secretions.

As would naturally be expected from the obduntation of the nerve centers which frequently precedes death, the cough becomes less, or may subside almost entirely for a day or two before the fatal termination.

There is at no time anything actually characteristic in the nature and quality of the cough in phthisis, its intonation depends entirely upon the vocal properties of the larynx.

THE EXPECTORATION.

Expectoration can hardly be claimed as a symptom belonging to the truly early stage of pulmonary tuberculosis; and even when in the tubercular area, the catarrh of the alveoli and bronchioles is well marked, their secretion is rarely abundant enough to give rise to outward discharge.

Such catarrhal states of the bronchioles may, however, cause irritation and cough, and the latter if prolonged may cause further congestion of the upper air passages through the occurrence of which a little glairy or foamy mucus may at times be expectorated.

But, like the cough, expectoration is either absent or insignificant in the stage of tubercle formation, and its more marked appearance coincides as a rule with the beginning of destructive changes in the lung, or with the bronchial inflammations, or pneumonias which frequently initiate this stage.

Tubercle bacilli and elastic fibres are not found in the expectoration until an open ulcer or cavity has been formed, and finding them, always indicates such a pathological state, though we fail to confirm it by physical examination.

Speaking from a pathological standpoint with reference to the local lesion from which such evidence comes, it means destruction of the tissue, and not an incipient or early period of pathological alterations. This is also true when tubercle bacilli are present in the blood of the so-called initial haemorrhages.

Sputum containing caseous detritus does not necessarily change its appearance or become distinguishable by the naked eye from that occurring in common bronchitis; although little opaque particles when present are suggestive, and are preferably selected for microscopic examination.

Bloody sputum is liable to be noted at any period in the course of phthisis. We must, however, guard against error through coloration of the sputum resembling blood by the presence of certain chromogenic bacteria which may give it a reddish pink, yellow, brown or green appearance.

Besides distinctly bloody sputum, we often find delicate streaks of blood or punctiform particles which usually come from ruptured capillaries of the bronchial mucous membranes, and especially when found in clear tenacious mucus, they have no special significance, and may occur with severe cough from any cause.

Some patients, especially those having previously experienced a haemorrhage, become exceedingly nervous when seeing the slightest trace of blood in their expectoration.

When blood is more intimately mixed with the expectoration, the latter may assume a light or darker red, pinkish, chocolate or dirty brown color, and the more homogenous the mixture appears, the more probable is it, that the sputum comes from a cavity or dilated bronchus from the ulcerating or suppurating walls of which extravasation of blood or capillary bleeding has occurred; the color depends upon the degree of dilution with pus and mucus and upon the length of time that the blood has been retained and exposed to the air in the lung.

Slighter discharges of blood may also occur with complicating pneumonic inflammation, and occasionally the sputum assumes the characteristic rusty hue as we see it in the croupous form.

The so-called numular or globular sputum with round, ragged edges is usually derived from true pulmonary or bronchiectatic cavities, and containing, as a rule, little or no admixture of air, it sinks in water.

The quantity of sputum is variable, and depends upon the degree and extent of the accompanying bronchial catarrh as well as upon the state, size and number of cavities which are discharged. It varies from the smallest quantity to a pint in 24 hours.

When cavities become acutely inflamed, or suppurate, the sputum becomes increased by the admixture of pus.

There is of course a certain relation between early and advanced phthisis in the amount of expectoration, but it is particularly in the sub-acute, catarrhal pneumonic form of phthisis that it is greatest throughout the entire course. In the fibroid form where the destructive processes are usually small in extent and circumscribed, the amount of sputum is correspondingly less and may be limited to a few small sputa in the morning, and when the cavities are dry and clean there is often no sputum at all.

Purulent sputum has a sweetish taste and a peculiar stale or sour odor; the latter becomes at times quite offensive, and retained coagula of blood and fibrin after haemorrhage and local extravasations may, through decomposition, become so much so as to suggest gangrene, but actual gangrenous processes in the walls of cavities are rare.

Chemical examination of the sputum in phthisis shows nothing characteristic. The averages of its constituents computed from various sources are: water, 90 to 95 per cent.; organic substances (albumen, mucin, cholesterine, fat and fatty acids, etc.), from 3 to 8 per cent.; inorganic substances (chloride of sodium and phosphates), 1-2 to 1 per cent.; the specific gravity varies between 1020 and 1040.

The formed elements as shown by the microscope are chiefly epithelium, pus, white and red blood cells, mucous fibres, elastic fibres, and besides caseous detritus and tubercle bacilli, we may find the various pus cocci, pneumo-cocci, diplo-cocci, and often a host of common saphrophites, most of which, however, come from the mouth and upper air passages. Ciliated epithelium is rarely found except with pneumonic complications. Small particles of lung tissue consisting of one or several aveoli have been noted, and calcareous concretions and grit occur in occasional cases.

PULMONARY HAEMORRHAGE.

Apart from the admixture of blood with the sputum, the expectoration of pure blood may be the first symptom of pulmonary phthisis. Its occurrence often coincides with some unusual physical exertion, but it may be observed without apparent exciting cause, as for instance when the patient is absolutely at rest and in bed, when without any premonitory symptoms, and perhaps waking up during the night, he coughs and expectorates blood.

In many cases of so-called initial haemorrhage the patient has enjoyed perfect health prior to its occurrence, and he as well as the interested friends and even the attending physician are often exceedingly reluctant to accept the existence of pathological alterations in the lung as standing in causative relation to this symptom; the preferable view that such is not the case may find further support if a physical examination of the chest gives a negative result.

Either on that account, or because of the desire to allay the fears of the patient and friends, the family physician often gives assurance that the bleeding came from the throat or the stomach, and it is remarkable how patients and their relatives cling to such explanations in instances where other symptoms suggest tuberculosis, when the haemorrhage was copious and when to a disinterested observer no reasonable doubt could exist that it proceeded from the deeper air passages.

When the general health has been impaired prior to the occurrence of the haemorrhage in anaemic girls or women with deranged menstrual functions, the diagnosis of vicarious menstruation is still finding unjustifiable favor in many professional minds, and although in some instances such a relation is apparent, the facts are, that while the physiological congestion coinciding with impending menstruation may contribute to the occurrence of haemorrhage, local structural alterations in the lungs are a pre-requisite condition to its occurrence.

A like condition confronts us with the cessation of accustomed bleeding from haemorrhoids, with which some patients console themselves as the cause of their pulmonary haemorrhage.

The so-called initial haemorrhages are as a rule slight or moderate, and vary from one or a few mouthfuls to four or six ounces. Exceptionally quite profuse haemorrhages have been observed. Unless pneumonia follows such a haemorrhage, the patient's condition may continue as before for varying periods of time, and if the destructive lesion has been quite limited, it may even heal and cicatrize without causing further symptoms. This, however, is not usually the case; or, if it is with the particular involved spot, there are as a rule other areas in which the tubercular process progresses or extends. The prompt recovery or absence of subsequent symptoms does not justify the assumption that all is over, and more pronounced pathological changes are almost sure to reveal themselves later on.

Pneumonia is not so apt to follow upon haemorrhage in the early stages, and it is comparatively rare when the haemorrhage occurs as a first symptom of the local disease. This is explained by the fact that at this period the bleeding is as a rule moderate, and the blood does not enter the bronchi faster than it can be coughed up without violent efforts; aspiration of the blood and of infectious material into other lung portions is thus avoided.

Haemorrhage occurs with increasing frequency as the disease advances, when it is usually more copious; the quantities discharged at one time may exceed a pint. As in the earlier stage, it is liable to be repeated on the same or upon following days, and by such repetition the total loss of blood may amount to a quart or even more.

Without considering the seriousness of the local pathological changes under which the haemorrhage is made possible, the dangers from the haemorrhage itself are from the loss of blood, from the occurrence of pneumonia and from suffocation.

The loss of blood even in small quantities in a wasting disease like phthisis is of course undesirable even if no other serious consequence follows; but if the haemorrhage is moderate, and the nutritive processes of the patient are good, there is no lasting detrimental effect. Neither does the occurrence of such uncomplicated haemorrhage affect the future course of the disease.

More profuse losses of blood are more serious in proportion, and in severe haemorrhages anaemia may become a marked feature, and may show itself for weeks and months thereafter in the impoverished blood state and by a rapid heart action, shortness of breath, deficient oxygenation, loss of appetite and digestive power and by diminshed weight and strength.

When such conditions are induced, they not only diminish the necessary reparative processes of the local lesion, but contribute to the advance of the disease by favoring more rapid caseation of tubercles, and the breaking down of already existing caseous deposits.

Immediate fatal results from acute anaemia are, however, rare; with large losses of blood, the blood pressure is rapidly diminished and the occurrence of fibrin coagula at the point of rupture is favored.

With very copious haemorrhage from a large vessel or an aneurismal sac, the blood enters the bronchi faster than it can be expelled, and the blood bursts forth from the mouth in a stream, and is forced out of the nose at the same time. In one case noted by the writer blood was also freely discharged from one ear which was the seat of destructive tubercular changes.

With the first inspiration the flow is momentarily interrupted, and the blood is aspirated into the larger bronchi. The induced cough may again force a portion of the aspirated blood into the trachea, but if the flow is not diminished by this time, the patient with the next inspiration floods the bronchial tree, and with a few violent inspiratory efforts for air, he dies quickly of suffocation. Fortunately, such a termination is rare, and I have been compelled to witness it only three times in all my practice.

In most cases of violent haemorrhage, the bleeding proceeds from a ruptured aneurismal sac situated in a large cavity, and when its contents have been discharged the bleeding moderates quickly.

All severe forms of haemorrhage are, however, likely to be followed by pneumonia, which is the most frequent, and apart from acute anaemia and suffocation, the most serious immediate result to follow. It is caused by aspiration of the blood, together with infectious material from cavernous and bronchial secretions into adjacent and distant portions of the lungs. While pneumonia is less frequent with initial haemorrhages, its danger was appreciated by the older authors, who, seeing the detrimental effects though without understanding the true relation of things, attributed to the retention and decomposition of blood in the lung the subsequent more evident phthisical processes which resulted from the caseation and destruction of the pneumonic area.

While the blood itself has of course nothing to do with the advent of pneumonic inflammation, it nevertheless conveys the pathogenic bacteria and irritants which produce it. In over 40 per cent. of severe haemorrhages that have come under my observation, the accident was followed by pneumonia, and in nearly every instance the pneumonia proved seriously detrimental in the future course of the patient's illness, quite a number of deaths occurring within a few weeks directly from the pneumonic inflammation.

In at least 15 per cent. of other cases, in which pneumonias did not occur, the haemorrhage had nevertheless a decidedly unfavorable influence upon the course of the disease, mostly on account of anaemia from the loss of blood, and while in the remainder of the cases haemorrhage was either moderate or was more rapidly recovered from, it proved in almost all instances more or less of an injury to the patients' nutrition, and on that account retarded their improvement.

Such an experience does not justify me to look upon pulmonary haemorrhages in the course of phthisis as a trifling occurrence, or as conducive to the relief of local congestion, and on that account as being of possible benefit to the patient.

The recorded frequency of pulmonary haemorrhages in the course of phthisis varies considerably with different authors, some of whom have seen it to occur in two-thirds and more of all their patients, while the percentage given by others is much lower. Thus Williams reports 70 per cent., but the majority of authors report only from 24 to 40 per cent.

My own clinical records show the occurrence of haemorrhage in 31 per cent. of all cases prior to their admission, but during their stay in the institution only 4 per cent. of these showed a recurrence of this symptom. Neither was haemorrhage more frequently observed in the 69 per cent. who had never suffered from haemorrhage prior to coming under my care. Of 832 patients who thus gave a history of one or more haemorrhages prior to admission 51, or 16 per cent. claimed haemorrhage to have been the first symptom, that attracted attention to their lung disease.

The low percentage of haemorrhages observed by me might, however, have been greater if the patients had all continued under my care until the final termination of their illness. This was only so with a portion of cases, but even in these I found no increase in frequency. On the contrary, the percentage for them is less than three.

There can be no doubt that in the majority of haemorrhages in the course of phthisis the accident coincides with increased intravascular pressure due to physical over-exertions by which the rupture of the vessel was favored while yet in a pervious state, and which without the strain would not have occurred, until its obliteration by thrombosis would have been accomplished.

That the occurrence of haemorrhage from over-exertion is less frequent in special institutions than in private practice would naturally be expected, inasmuch as the strict supervision of all that pertains to the patient's mode of life guards him against overexertion and other accidents liable to have an unfavorable influence upon the course of his disease, or to cause relapse from the improvement made.

This view is supported by the reports from other special institutions, all of which report remarkably few haemorrhages as compared with statistics from private practice.

The haemorrhages observed in institution practice may, therefore, be claimed to occur as a rule without contributing influences on the part of the patient's mode of life and conduct and the frequency being thus greatly diminished, the occurrence of haemorrhage is limited to rapidly extending destructive processes, under which the haemorrhage assumes a more serious aspect, and gives it a much more serious significance both as to the local lesions and as to its immediate results.

Some authors claim a greater frequency of haemorrhages for women than for men. Others see no material difference, and still others have observed that men suffer most frequently. The latter view seems to be borne out by the histories of my patients who had haemorrhages prior to their admission, the percentage for men being 56 and a fraction.

On the other hand, with the haemorrhages which occurred during their stay in the institution, the frequency is in favor of women, who show 59 per cent.

Apart from the fact that the cases treated were in the proportion of 47 per cent. to 53 per cent. for women and men respectively, and, barring the chief contributory cause of overexertion, the tendency to haemorrhage is undoubtedly increased in menstruating women, and my own cases show this to be a fact. On the other hand, men are less inclined and often less favorably circumstanced to profit from proper advice, especially as it pertains to the permissible limits of exercise, and if I should rule out about ten haemorrhages in men, due to wilful disobedience, the relative frequency for the two sexes would be still greater for women.

Haemorrhage rarely occurs before the age of puberty, and in my cases it has been most frequent between the ages of 20 and 30.

NIGHT SWEATS.

Patients without fever and without markedly sub-normal temperature in the early morning hours are as a rule not troubled by this symptom; although at times noted as one of the earliest clinical manifestations of pulmonary tuberculosis, night sweats belong usually to that period of the disease in which destructive changes are initiated or in progress, and they are then associated with hectic fever.

Night-sweats are, of course, not pathognomonic of pulmonary tuberculosis and may occur in the convalescence from acute diseases, particularly the infectious ones; we also observe them in malaria, with septic processes, and with exhaustion from suppuration in any part; but, as already stated, when they occur in pulmonary tuberculosis, they appear to indicate the absorption of dead, disintegrated tissues, exudates, pus, etc.

Fever is almost always a prominent symptom in connection with night-sweats, and in many of the cases where it is apparently absent, close observation shows that considerable rises occur toward evening, during the night or during sleep.

In the few instances in which I noted the absence of fever, the temperature had become considerably sub-normal toward morning.

Except in acute, miliary tuberculosis, in truly septic cases, and in acute phthisis, phthisical patients rarely sweat while awake; if they do it can, as a rule, be attributed to mental excitement, severe spells of coughing, excessive clothing, to injudicious heating of rooms, or to exercise; and while some persons naturally perspire more easily and freely than do others, sensible perspiration while awake and at rest so as to soak the body-linen or bed-clothing does not often occur without the influence of drugs, except in true sepsis, in great exhaustion or in collapse.

When, however, the reflex irritability of the nervous system, and especially of the vaso-motor centers, is greatly diminished in sleep, and when these centers have previously been irritated or unduly stimulated by auto-infection, through the absorption into the blood of products from suppurating and disintegrating tissues, or by retention of waste products, then the previous tension gives place to a state of relaxation, under which the free perspiration takes place.

It usually stops when the patient is thoroughly aroused, but may recur several times during the same night, and in bad cases, every time after the patient falls into a sound sleep, and if the conditions of the temperature are favorable such patients sweat as profusely when they sleep during the day time.

The following table represents twenty-four observations made of the behavior of the temperature before and during the hours of sleep which preceded severe night-sweats; the maximum temperatures during sleep were obtained by careful retention of a self-registering instrument in the axilla, with the arm bandaged to the chest:

TABLE SHOWING TEMPERATURE VARIATIONS DURING SLEEP PRECEDING NIGHT SWEATS IN PHTHISIS.

Observation Number.	Minimum Temperature in 24 hours.		Maximum Temperature in 24 hours.		Temperature before going to sleep.		Temperature on waking wiih sweat.		Max. Temperature during sleep. Deg. F.	Fall of Temperature during sleep. Deg. F.	Range of Temperature in 24 hours. Deg. F.	REMARKS.
	Time.	Deg. F.	Time.	Deg. F.	Time.	Deg. F.	Time.	Deg. F.				
1	8 A. M.	97.6	5 P. M.	100	11 P. M.	99	3 A. M.	98	101.5	3.5	3.9	
2	7 "	96.2	8 "	100	11 "	99	4 "	97	100	3	3.8	
3	6.30 "	95.5	6 "	103	10 "	101.1	5.30 "	98.5	101.2	2.7	6.5	1-100 gr. atrop. and 1-20 strych. at 10 P. M.
4	8 "	96	2 "	104	11.30 "	100	2 "	96.5	101.5	4	8	Same patient as No. 3.
5	8 "	97	8 "	102	11 "	99	4 "	99	102.5	3.5	4.9	
6	11 "	99	2 "	102.5	11 "	101.2	5 "	103	103	....	4	Septic case; temperature rose 1.8 F. during sleep.
7	8 "	97	2 "	99.5	11 "	98.8	4 "	97.5	99.5	2.0	2.5	
8	2.30 "	97	7 "	104.2	11 "	101.6	2.30 "	97	102	5	7.2	
9	8 "	100	1.30 "	102	11 "	99	6 "	100.4	105.5	5.1	5.5	Same case as No. 6,
10	6 "	97	4 "	100.8	10 "	98.6	2 "	99	99	....	3.8	Temperature rose 0.4° F. during sleep.
11	4 "	96.5	8 "	100.5	10 "	100	4 "	96.5	100	3.5	3.5	
12	8 "	97	6 "	101.5	11 "	99.2	1.30 "	97.5	102	4.5	5	
13	6 "	95.4	2 "	98.4	10 "	98.4	12.30 "	96	98.5	2.5	3.1	
14	8 "	98	2.30 "	99	9.30 "	98.6	11 P.M.	99.5	101.4	1.9	3.4	
15	6.30 "	97	8 "	100.6	11 "	100	6.30 A M	97	100	3	3.6	
16	8 "	98	6 "	100.2	10.30 "	99.6	1 "	100	103.2	3.2	5.2	
17	8.30 "	97.5	8 "	98.4	10 "	98.4	6.30 "	97.5	101	3.5	3.5	
18	9.30 "	100	11 A.M.	105.2	2.30 "	104.4	5 P. M.	102.8	106.2	3.4	6.2	Case of acute phthisis. morph. 1-4 gr., atrop. 1-60 gr. at 2.30 P M.
19	1 "	99	11 "	105	9 "	103	1 A. M.	99	103	4	4	Same patient as No. 18.
20	8 "	97	8 P.M.	100.4	10 "	100.3	11.30 P.M.	100	101	1	4	Patient sweat again profusely at 7 A. M.
21	8 "	97.4	3 "	101	11 "	100.6	2 A. M.	100.5	100.5	....	3.6	1-60 gr. strych. at 11 P. M.
22	8 "	96.2	4 "	100.4	11 "	99	7 "	96.4	98	3.6	4.2	
23	8 "	98.8	8 "	103.5	11 "	102.5	5 "	99	103.5	4.5	4.7	Case of caseous pneumonia with pleurisy.
24	6 "	95.4	6 "	99	10 "	99	4 30 "	96	100.4	4.4	5	Same case as No. 23 two weeks later.

Interesting features of these observations are the considerable rises of temperature which occurred during sleep in more than half of the cases between the last observation before going to sleep and the time of awaking, and the total variations of the temperature in twenty-four hours.

As to the degree of sweating, I found it as a rule to stand in relation to the degree of total variation of the temperature; and one of the most severe instances of night-sweats I ever saw was the case recorded under observations three and four, showing a total variation on the second trial of 8 degrees Fahrenheit in the twenty-four hours. This patient on several occasions required not only a change of night-clothing and bed-linen, but also of the hair mattress, which was soaked so as to be wet on the under side.

Since the preparation of the above table, further observations have been made in a like manner, especially in such patients whose temperatures were normal or nearly so during their waking hours, and nevertheless reported to have been sweating more or less profusely during the previous night. In quite a number of such we found temperature rises from one to several degrees to have occurred after going to sleep, but there were also those in which it had not risen at all, but had become reduced to 95 or 96° F. toward morning. One case proved peculiar in that he never had a sweat when the thermometer was tied under his arm, but sweat again when it was omitted, and the patient's statements were actually found to be correct.

In milder cases, the patient sweats only on the head, particularly on the part which rests against the pillow, and on the neck and chest.

Apart from the hectic fever, and the coinciding of a rapid fall of the temperature in the early morning hours, when sweats occur most frequently, other causes have been considered especially for those cases in which the presence of fever does not account for the phenomenon.

As other causes, the diminution of the respiratory surface and the diminished elimination of carbon dioxide have been suggested by Traube, and in more recent years the toxin theory has been urged as a cause for this as for all other general symptoms in phthisis.

Against Traube's proposition we might interpose that night-sweats can occur in the very early stages, at a time when physical examination of the lungs gives only negative results, and when the vital capacity has not been diminished to an appreciable degree, and while the theory of toxins can neither be proved or disproved, it must not be overlooked that night-sweats occur often very profusely in the well-established convalescence from other diseases, and therefore at a period when the presence of toxins is at least doubtful, and when the weak condition of the patient offers a better explanation since we know that even in the absence of actual disease the weak and delicate are as a rule more inclined to perspire than are those who are strong and vigorous.

The toxin theory would be better supported if it could be shown that the artificial introduction of toxins causes the appearance of night-sweats, which is, however, only the case when the given doses are also attended with fever, and when the decline of the latter occurs during sleep.

In this manner sweats can be induced by the subcutaneous administration of a variety of albuminoid substances, but only as with specific toxins, if they are given in sufficiently large doses to also produce fever.

I have thus induced fever and sweats by the hypodermic injection of substances that are not toxins in the ordinary sense of the term, such as nuclein, blood-serum, beef extract, peptones, etc., all perfectly sterile and given under aseptic precautions.

On the other hand, I have never seen night-sweats to follow the use of Tuberculin and other specific toxins from the tubercle bacillus, unless given in fever producing doses; on the contrary, I have often seen the disappearance of night-sweats under their judicious use, and like observations are reported by Dr. Sutherland. (1)

The sweat in phthisis contains nothing characteristic and the claims of its containing tubercle bacilli or specific toxins were never substantiated when the water was collected and examined with proper precautions.

The rapid decline of such patients in strength and vitality is, of course, not so much due to the loss of water, but to the pathological changes which cause it, and to the distress and loss of sleep which the sweating produces. When severe and often repeated, night-sweats become one of the most distressing symptoms in phthisis, and such patients often dread to go to sleep. Their rest is much disturbed, and especially in winter, it is only with the greatest care of the room temperature, and with readiness of changes of clothing and of proper attendance that such patients can be kept from taking cold.

Night-sweats usually cease with the occurrence of acute inflammatory processes, such as pneumonia and acute pleurisy, and remain in abeyance, while the temperature shows a continued type. As the acute inflammation subsides, the sweats recur often with increased severity.

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(1) Sutherland: Journal of Tuberculosis, Vol. 1, No. 3, p 127.

A like relation is at times apparent between the occurrence of night-sweats and diarrhoea, the sweats stopping and recurring with the advent of diarrhoea and its subsidence.

THE CIRCULATION.

A small, rapid pulse is a common symptom in the course of pulmonary tuberculosis and may precede the advent of fever and cough.

Its early occurrence, either alone or associated with more or less anaemia, at a period which has, I believe, been erroneously designated the "pre-tubercular stage", led to the theory that the heart and vascular system itself were primarily at fault, and that its imperfect development gave rise to those symptoms and was a strong predisposing factor to the development of phthisis.

At that time and since, I have been interested in determining the correctness of this theory, and although I have been frequently able to confirm the abnormal phenomena as to the rapid heart action and small volume in the radial artery, I have but rarely been able to satisfy myself that the heart in such patients was smaller than in healthy subjects of equal size and weight, a theory which was maintained by the late Dr. Brehmer. In addition I found that such patients are already suffering from tuberculosis, and have been able to confirm this by the Tuberculin test, when physical examination gave only a doubtful result.

The small and rapid pulse, though at times present in the early stages, is more frequently observed as the disease progresses, until in the last stages it is almost the rule.

In the earlier periods, the condition may become only apparent toward the close of the day, when the patient has been up and about, taking more or less exercise; in others we notice this behavior of the circulation on even slight exertion, and I have often observed a good pulse of 72 or 84 to be greatly increased in frequency, and to become small, from the simple act of rising and dressing.

In many such cases the general appearance of the patient was quite satisfactory, the nutrition was still good, and the color of the skin and mucous membrane gave no indication of anaemia. In more recent years, I have made blood counts, and estimated the haemoglobin per cent., and usually found normal values. Neither had degeneration of leucocytes or other abnormal blood changes occurred.

In some instances anaemia was present, but in the greater portion of these it could be distinctly shown that it occurred at a later period, the abnormal pulse having preceded it for various periods of time.

The theory that a small heart is a cause of tuberculosis has in more recent years been given up by most clinical observers, and the weak heart action is now preferably attributed to the disease itself, occurring through the deleterious effect of specific toxins of the tubercle bacillus or of associated pathogenic bacteria upon the nervous system or upon the heart itself.

The incorrectness of this belief I believe to be abundantly proved by the observed fact that the therapeutic administration of specific toxins from the tubercle bacillus has never such an influence upon the circulation, but that very often the pulse becomes less frequent and of better quality under their use.

Neither does it appear to me that the diminished blood pressure in the arterial system requires a toxin theory for its explanation. The frequently present accentuation of the second pulmonary sound certainly speaks for increased pressure in the pulmonary artery, which implies that there is a hindrance to the free delivery of the blood to the left ventricle, which therefore receives a less quantity in a given time than it would were there no such hindrance for its passage through the lungs.

This deficiency can only be compensated by increased force on the part of the right ventricle, and so long as this force is sufficient symptoms of tachycardia are not present.

When, however, a greater demand for arterial blood arises than the pervious vessels in the diseased lung plus the power of the right ventricle can supply, rapid heart action with a small, rapid pulse is a necessary effect.

The cause of the obstructed pulmonary circulation is easily understood by the pathological alterations found in the lungs in which the arterioles and capillaries take a more or less pronounced part. It is a well known fact that their walls and immediate vicinity are often the seat of tubercles and of obliterating arteritis, and that this may be the case in a very early stage of the disease.

In the more advanced cases additional causes arise from compression, distortion and obliteration of vessels through new formed interstitially situated tubercules and inflammatory exudates and adhesions, and the fibroid and cicatrizial changes in older deposits as well as the caseous and destructive processes, need only to be mentioned to cause appreciation that the various pathological changes in a tubercular lung must of necessity diminish the available channels for the passage of the blood from the right to the left ventricle.

There are of course other causes for tachycardia, and especially must we recognize the general wasting and cachexia in the advanced stages of phthisis, due to fever, suppuration and other complications which influence the blood state and general nutrition, and it would be most singular to expect that the heart and circulation should not participate in the general decline of strength and vitality.

Tachycardia in the course of pulmonary tuberculosis occurs also, but less frequently through neuritis or from compression of the trunks or branches of the pneumogastric or the phrenic nerves. Quite a number of instances in which this was demonstrated by autopsy are recorded in medical literature, and Cornet (1) cites a remarkable case by Besancon in which the asystolic pulse reached a frequency of 160, accompanied by great dyspnea, cyanosis, albuminuria, oedema and anaemia. Post mortem examination showed great enlargement of the tracheo-bronchial glands, the left pneumogastric was imbedded and adherent with a mass of indurated lymph glands above the point where the recurrent nerve is given off; the heart was small and flabby, but without pathological alterations of the valves.

Excluding these causes and marked degree of anaemia, we find that in the great majority of cases the presence of obstruction in the pulmonary circulation is actually present and can be demonstrated by physical examination of the heart itself, which shows a sharp, accentuated closure of the pulmonary valves without evidence of valvular disease of the left side of the heart to account for it.

Clinically, the obstruction in the pulmonary circulation shows itself first only after exercise. At this time the heart action is not yet unduly rapid and weak; on the contrary, the contractions appear strong and forcible, and if anything beyond the accentuation of the second pulmonary sound attracts attention, it is that there is not a sufficiently large and firm pulse to correspond to the forcible heart action.

When at this time proper measures are neglected the heart strain becomes continuous during the entire day, but the increased intrapulmonary pressure disappears during a night's rest. As the heart is overstrained most of the time, a period soon arrives when any unusual exertion causes palpitation and a rapid and weak pulse, which finally becomes the rule.

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(1) Cornet: Die Tuberculose, aefrea Hoelder Wien 1899, p 348.

The recognition of the relation of tachycardia to obstruction in the pulmonary circulation is of great importance from a therapeutic standpoint, as we shall see when, in a subsequent article, the question of its treatment will be taken up and when it will be shown that in the early stages the cause can often be removed, and that even with only partial removal or unabated continuance of the cause, the occurrence of the disordered circulation and feeble heart action can be prevented and a satisfactory circulation can be restored in all those cases where the disease is otherwise not hopelessly advanced.

In all stages of the disease the blood itself may show deterioration both in respect to quantity and quality. The number of red blood cells may diminish 50 and more per cent., and with or without their decrease in number the percentage of haemoglobin becomes often markedly reduced.

An interesting study of the changes which occur in tubercular phthisis in the leucocytes was contributed several years ago by Dr. A. M. Holmes (1) in which the author shows a progressive decrease in young leucocytes and a corresponding increase in phagocytes with the advance of the disease.

THE DIGESTIVE ORGANS.

A good digestive apparatus is one of the cardinal requisites for a favorable prognosis in pulmonary tuberculosis, and if a patient is fortunate enough to possess it, we must ever be watchful that nothing shall occur to impair it.

In many cases the occurrence of tuberculosis appears to be the penalty for its previous abuse by injudicious diet and excessive use of alcohol, leading to fermentative dyspepsia and catarrhal affections which decrease the natural vitality and the resistance to infection.

In the established disease the question of proper digestion and assimilation of food is ever a vital one and renewal of active symptoms, and the occurrence of destructive changes can often be shown to stand in relation to gastro-intestinal derangements, under which the nutrition suffered.

Loss of appetite may be one of the earliest symptoms in pulmonary tuberculosis, and may occur in any stage. It is often noted when we cannot find any apparent cause; and may reach a degree that the patient loathes even the sight of his food, and although upon urging he makes the attempt to eat, he succeeds only to the extent of swallowing a few mouthfuls and protests that he cannot possibly take more. I have seen such anorexia in sensible patients, appreciating the necessity of taking food and anxious to help themselves and who with their best efforts failed utterly in the attempt.

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(1) Holmes: Medical Record, Sept. 5, 1896.

In the absence of any apparent derangement of the digestive organs, and with normal gastric secretions both in quality and quantity the cause for such anorexia must undoubtedly be of nervous origin, and one naturally thinks of irritation of the pneumo-gastric nerves, but the proof is difficult or impossible to supply in the individual case, since apart from the anorexia there are as a rule no other symptoms which corroborate the irritation theory. With most patients the anorexia is, however, only temporary and may disappear and recur at intervals.

In contrast to these cases we observe others in which the appetite appears not only good, but in which it is unnatural, the patient complains of hunger a short time after taking a large meal, and ingests quantities of food, often to an incredible amount. Although this unnatural desire for food is often of short duration, during which material increase of weight is observed, I have seen it maintained for very long periods, and in a moderate degree throughout the disease regardless of fever or cough, or of other conditions which impair the appetite under ordinary circumstances. The gain in weight is, however, not continuous, and gradual decline occurs as the disease advances in spite of the large quantities of food taken.

The most common cause for loss of appetite is fever, and most patients are influenced in their ability or desire to take food by even comparatively slight elevations of temperature, if coinciding with the hours for meals.

The fact that a patient does not eat well at dinner or supper is frequently explained by the temperature chart which shows one or more degrees of elevation to correspond to that particular time. In the advanced stages, in which decided subnormal temperatures occur toward morning the appetite for breakfast is also diminished or lost by the sense of exhaustion and from fatigue through coughing which usually coincides.

When cough has become a more prominent symptom the ingestion and more particularly the retention of food is often interfered with; such patients are apt to attribute the cause of vomiting to their stomach, claiming that it is weak and does not digest food. Upon investigation we often find the digestive organs perfectly normal, but the pressure of the food in the stomach appears to excite cough, or the hot food and drink cause free expectoration, the vomiting becomes then an entirely mechanical act and is due to contraction and pressure of the abdominal muscles upon the stomach.

In other instances the presence of post-nasal and pharyngeal catarrh gives rise to reflex nausea and to vomiting. The tickling and irritation from tenacious mucus in the naso-pharynx causes the patient to retch and hawk until nausea and vomiting are induced.

With such functional derangements loss of weight and strength become the rule, and their subsidence coincides with a more favorable course, in which the weight is increased and may reach the normal or even exceed it.

Often, however, new complications arise either on the part of the digestive organs or through renewed activity of the lung disease, the gain in weight and strength is lost, and after various ups and downs in the patient's nutrition a time arrives when it becomes difficult or impossible to regain the lost ground, even during periods comparatively free from fever, and with the ingestion of sufficient quantities of food.

This is probably due to the diminished aerating surface of the lung and the thereby diminished oxygenation of the blood and of the tissues, a condition to which the organism adjusts itself by a decrease in the quantity of the blood as well as by limiting the bulk of tissues to be supplied.

If we attempt to force the further increase of weight in such patients or if we endeavor to secure gain or to prevent loss in the active course of the disease by causing them to take excessive quantities of food, we occasionally succeed for a short time, after which arise various derangements in the digestive organs accompanied by evident atony of the stomach.

Tolerant as the stomach may have been in health to abuses from habitual over-eating, from errors in the selection of food, excessive use of alcohol, etc., this tolerance becomes less and less in a chronic febrile disease; and if the patient is urged to eat much and often, and he follow such advice, the result is not always a gain of lost weight, but oftener the food is not appropriated and we then observe the discharge of the unused material by the occurrence of several copious stools which are as a rule only partially formed. Further persistence in such a course is apt to lead to acute attacks of indigestion which occur first only on particular occasions; intervening between them, there is more frequently a sense of fullness, oppression and drowsiness after eating, symptoms which lead to the prescription of artificial digestive agents, or to the use of alcoholic stimulants and condiments.

Such prescriptions may give temporary relief, but eventually they contribute to an increase of the symptoms, and so the case goes on until either by the physician's or patient's good sense, the forced feeding is abandoned, or until the entire loss of appetite and the occurrence of nausea or diarrhoea compel at least a temporary halt.

The atony is easily determined when we test the patient's digestive powers with a trial meal. Instead of four or five hours, the digestive process is not completed until several hours later; a decrease of free hydro-chloric acid, the presence of the lactic and fatty acid, and abnormal quantities of mucus are often found; in cases of some standing more or less dilatation can be made out.

Subjectively, these patients complain of abdominal fullness and distention, headache, loss of appetite, burning in the stomach, of eruction of gas, and of bitter, sour stomach contents.

The bowels are obstinately constipated, with occasional attacks of diarrhoea intervening; there is a bad taste in the mouth, and the tongue is usually coated.

When such a state of the digestive organs is induced by over-feeding, or is present from other causes, the outlook is not a very happy one as to the eventual recovery from the lung disease, and while there is no end to the remedies and methods for the cure of gastric catarrh and atony, in the written pages of text books and monographs on the subject, the sufficiently quick reversal of this state of affairs to the return of even approximately normal digestion, or to a degree sufficient to regain the losses or at least to maintain the patient's present nutrition, is one of the most difficult problems we have to face in the treatment of such patients.

If the patient did not have pulmonary tuberculosis, the outlook for recovery from the gastric complication would of course be better, and in cases in which the disease is otherwise at a standstill the chances are not quite so bad; but very often forced feeding is resorted to, and the digestive organs give out completely just at the time when the disease is in a progressive stage.

The reputation of forced feeding in phthisis is undoubtedly due to its employment in those cases in which there is an aversion to food, in the so-called nervous dyspepsia, in such I have myself resorted to it in some instances with the aid of a stomach tube, and have seen excellent results.

But even in this class of patients we must exercise great care, and circumspection, not to overdo the thing, and at no time is it permissible to introduce more food than we find is well borne by the digestive organs, no matter whether we treat a case of phthisis or of any other disease.

The intestinal affections which occur in the course of pulmonary tuberculosis are chiefly features of the advanced stage, and result either from secondary tubercular processes of the intestinal mucous membrane, or of adjacent parts, or they take the form of colliquative diarrhoeas in connection with amyloid degenerations and with the general exhaustion toward the close of life.

In the early stages the functions of the intestinal tract are usually normal and liable to like disturbances as occur in health from errors of diet, etc.

With higher or prolonged periods of fever, the bowels are more inclined to constipation and with the advent of gastric complications, such as hyper-acidity, fermentation or catarrh, constipation may alternate with attacks of diarrhoea, precisely as we observe when such stomach affections occur independently of phthisis.

In not a few cases, tubercular changes in the intestinal lymphatics, the mesenteric and retroperitoneal glands or in the thoracic duct precede the occurrence of pulmonary phthisis, and the primary chronic involvement of these structures may explain the deficient nutrition, often despite a good appetite, in subjects which are and have always been markedly under weight. With extensive involvement of the lymphatic apparatus, the blood vessels and especially the veins become obliterated, inducing various degrees of congestion, through which loose bowels or even severe chronic forms of diarrhoea may be maintained, and many cases of so-called chronic diarrhoea, have a tubercular substratum in the sense indicated.

Like pathological alterations occur occasionally in the course of phthisis, through infection with sputum which the patient swallows. The bacilli reach the lymph channels and glands through absorption and without becoming localized in the mucosa.

We see thus, that tubercular ulceration in the bowel is not necessarily present even in the most obstinate diarrhoeas in the course of phthisis, and that diarrhoea may be caused by the obliteration of the absorbent and blood vessels in the walls of the intestine, or in the mesenteric glands.

The unfavorable course which such cases pursue is easily understood by the non-absorption of nutriment, and by the association of auto-intoxication from fermentation and decomposition of the intestinal contents.

Such patients lose weight more rapidly, and although the lung symptoms may abate, the exhaustion is progressive.

I always look with great suspicion even upon the presence of semi-solid stools when in spite of proper diet and regimen they continue in this state for long periods of time.

Progressive loss of weight, however it may be induced, is always a symptom deserving our greatest attention. It first affects only the fat and cellular tissue, later it includes all the tissues, especially the muscles which in extreme emaciation shrink to a degree that they are represented by little more than strings.

The muscles of the arms and of the legs, neck and chest appear to suffer first and most; but toward the end of life when death is not due to inter-current complications the emaciation becomes so extreme, that there appears little left except skin and bone.

Increase in weight on the other hand is a favorable symptom showing as it does that the organism is still capable of a fair degree of nutrition, and that existing losses may be recovered from as the local causes disappear and other complications are removed.

It is therefore of the greatest importance that all gastric and intestinal complications should be prevented or if present that they receive the most painstaking care and consideration, at the very earliest period.

THE NERVOUS SYSTEM.

The symptoms on the part of the nervous system are chiefly due to the decline of the general health and vigor, and in the earlier stages of the disease when the nutrition and blood state are still good, or when through appropriate care and treatment substantial improvement has again occurred, patients suffering from pulmonary tuberculosis have no special nervous symptoms that are attributable to their disease.

The hopeful disposition which some such patients manifest as to their ultimate recovery or their unwillingness to admit the nature of their disease is largely due to the suggestion of relatives and friends, and to the opinions they receive from their medical advisers. In this respect there is, however, the greatest difference in different individuals, and I have frequently seen the reverse attitude.

The general character and disposition of individuals in health is often materially changed in illness and the more so in a chronic, wasting disease.

Impatience and irritability of temper may be due to disappointment, and few patients escape it entirely inasmuch as no one calculates to be overtaken by serious illness, with the sacrifices in social and economic respects that it implies.

While some persons are naturally gentle and sweet in disposition and manners, and preferably do what is right, the majority are and act so, by the exercise of more or less self control, which is diminished or lost with the failing health and strength.

Such patients become capricious, irritable, vacillating and selfish, and they betray deficiencies in character which were hidden and controlled in health, and that the cause lies in the failing nervous energy is shown by the fact, that in all cases there is a gradual diminution in ability for prolonged mental efforts, and that often the memory fails to a remarkable degree at the same time.

But the natural desire to live usually gains ascendancy and causes the patient to look optimistically upon his prospects for recovery, the more so as he approaches the incurable stage in which he may cling to the slightest ray of hope. A little less cough or fever, a good night, without a sweat, the ability to take a good meal, or relishing it better than at other times, causes the most sanguine expectations and result in efforts and plans for the future.

Real and continued improvement which justifies the expectation of recovery is at times less appreciated by patients than are the slight variations in the downward course of the disease when they happen to be in the patient's favor, and it is strange to observe the impatience often expressed in improving patients, because they cannot recover their health in as many weeks as it has taken months and years to lose it. Indeed many such patients fail in their ultimate recovery through their hasty efforts to find ways and means by which they expect to improve faster, and become thus the victims of quacks and charlatans.

Much more might be said exemplifying the want of good judgment, of will power and self control in many phthisical patients, through which they commit errors and indiscretions that contribute seriously toward an unfavorable course of their disease, and for the avoidance of which strict professional supervision and control are almost indispensable.

Such professional control becomes an essential part of treatment, and the physician who is to exercise it must be one of strong individuality, character and determination. He requires a keen insight into human nature to enable him to recognize the frailties of individual patients and to appeal to them according to their need, in order to secure strict and continuous compliance with his directions.

The symptoms of headache, sleeplessness, drowsiness and general depression of spirits and the neuralgias, myalgias, diverse pains and sensory disturbances which are often observed in the course of the disease, are as a rule due to the physical state of the individual, such as fever, quantitative and qualitative alterations of the blood, vaso-motor disturbances which produce hyperaemia and anaemia of the central and peripheral nervous system, and of other organs, causing abnormal functions.

Such blood changes and vaso-motor disturbances result from the general malnutrition and auto-intoxication either directly in connection with the pathological processes in the lung, or from actual disease or perverted functions of the digestive tract and eliminative organs, especially the skin and kidneys.

Actual mental disease, melancholia and acute mania, have been observed, and I have seen a few instances myself. In such cases, however, we cannot hold the lung disease responsible, and apart from possible tubercular changes in the brain itself, the occurrence of mental disease is no doubt entirely accidental.

The sleep is usually normal and undisturbed except through fever, cough, night sweats or other complications which are painful and prevent sleep on that account.

Some persons are kept awake by even slight degrees of fever, and if patients complain of insomnia the fever thermometer frequently reveals the cause.

In other instances loss of sleep is due to worry and general depression of feelings, to a train of thought and reflections upon the past, present and future, which the patient finds himself at times unable to escape when he is alone, and which he succeeds in repressing by mental diversions from contact with his environment during the day.

THE GENITO-URINARY ORGANS.

The urine in the early stages is usually normal in quantity and quality with only such changes as we observe in other diseases that are attended by fever, gastro-intestinal complications, loss of weight, etc.

In the advanced, but sometimes also in the earlier stages, in acute dissemination and general miliary tuberculosis, Ehrlich's Diazo reaction is often present, which is claimed by Ehrlich and more recently by Michaelis to have an almost uniformly unfavorable prognostic significance.

After having studied the subject from a clinical standpoint myself for nearly a year, I cannot agree with these authors, in all respects, although I must admit its presence to occur as a rule only in the grave cases, in which the prognosis is doubtful apart from the observed reaction. Nevertheless, I have with few exceptions been able to cause the reaction to disappear by the copious drinking of hot water before meals, and most of my patients have not only improved, but complete arrestment and apparent recovery has been observed in several instances when the reaction was well marked, before its treatment by elimination through the kidneys was undertaken.

The prognosis is necessarily more serious in the class of cases in which it is usually observed than it is in the earlier stages of the disease, but I see no difference in my results between my advanced cases where it was present and those where it was absent.

With my present limited experience, I am therefore not inclined to consider the presence of the reaction as an element of prognosis, but rather as an indication for the necessity for elimination of accumulating waste products, and in that respect it is valuable because in some of my cases the quantity and quality of the urine showed nothing otherwise that would have suggested such treatment.

The test for the diazo reaction is made as follows: Prepare two reagents A and B.

Reagent A contains 25 parts of muriatic acid in 500 parts of water, to which are added two and a half parts of sulpho-anilic acid.

Reagent B is a solution of one-half part of nitrite of soda in 100 parts of water.

To test a specimen of urine, take 49 parts of reagent A and add one part of reagent B and shake them together. Then take 10 cubic centimeters of the freshly prepared mixture, and add to it an equal amount of the urine.

Next add to the mixture (of urine and reagents) by quickly pouring it into the test tube, 2 to 2½ c. c. of aqua ammonia (10 per cent).

If a rose red, or scarlet red colored foam appears on shaking, the reaction is positive, otherwise negative, and no account must be taken of any other resulting color. Any doubt may, however, be eliminated by allowing the liquid to stand in the test tube for 24 hours, when in case the reaction is present, a dark green precipitate will be observed.

The chief sources of error in making the test come from deteriorating reagents, excess or deficiency of ammonia added, or from adding the latter dropwise instead of in mass.

Interstitial or parenchymatous nephritis is of exceedingly rare occurrence in the course of pulmonary tuberculosis, a remarkable fact, when we consider how frequently such kidney affections are observed in other infectious diseases. My own records of several thousand cases show such a complication only five times, and even in these it could not be shown whether the kidney disease existed before or occurred during the course of tuberculosis.

Diabetes Mellitus occurs in a larger number, but as a rule, the diabetes precedes the tubercular disease. According to German See about 25 per cent. of all diabetics die of phthisis. The presence of sugar in the blood and tissues undoubtedly favors not only the infection, but also the rapid extension of the disease, since we know that the addition of sugar to artificial culture media causes a more rapid and luxurious growth of the tubercle bacillus.

Amyloid degeneration of the vessels of the kidneys is not an uncommon sequela of chronic phthisis, and with it we find albumen in the urine; albumen is also present in tuberculosis of the kidney, in the advanced stage of which we frequently find also blood, pus, caseous detritus and tubercle bacilli.

Tubercular affections of the kidneys, bladder and male genitals when found in connection with pulmonary tuberculosis, are as a rule, primary and not secondary to the lung disease, the clinical history in most of the cases that I have seen showed the involvement of these organs to have preceded the lung affection for considerable periods of time, and the like is probably true of the female genitals, although the tubercular affections of these, especially of the ovary and uterus are difficult of diagnosis and often remain obscure for a long time or until an autopsy reveals their presence.

With the progressing emaciation and anaemia the menstrual functions become irregular, the loss becomes scant and sooner or later menstruation ceases entirely; but the physiological congestion of the internal genital organs may still occur, giving rise to the usual sensations of approaching menstruation and occasionally a decided leucorrhael discharge is observed to correspond with the menstrual epoch.

While the cessation of menstruation causes serious apprehension many times on the part of patients, it is nevertheless a curative effort of nature to prevent further waste and loss to the impoverished blood, it is therefore hardly necessary to say that no direct efforts are justifiable to re-establish it. If the patient improves again and if her nutrition and blood-making processes become adequate, the menstruation will return, without interference of any kind.

In married women the question of pregnancy may arise, when the menstruation is missed, and although conception rarely occurs at a stage of the disease when we can expect that the function would cease on account of the declining general health, nevertheless it is not impossible even in the later stages for a woman to become pregnant. Occasionally the intercurrrent pregnancy appears to favor the temporary improvement of the local lung disease, or at least to check its rapid progress, but in most of the cases the hopes engendered prove delusive and if the patient arrives at the end of her term the disease proves as a rule rapidly progressive and fatal after delivery.

In the earlier stages, however, when the intervening period can be taken advantage of by proper treatment, and if the patient is not seriously handicapped in her nutrition by nausea and vomiting, it is quite possible that a permanent arrestment may be accomplished before delivery, and I have records of a number of cases where the mother passed through her pregnancy under continued improvement and suffered no relapse thereafter. This, however, applies only to early stage cases.

THE SKIN AND ITS APPENDAGES.

Excluding the true tubercular lesions which are extremely rare complications in phthisis, the skin and its appendages present no important symptoms. In cases who suffer from profuse perspiration, we occasionally note the eruptions of miliary vesicles upon the skin, which, however, give no special discomfort; but the condition of the skin in any stage of the disease is frequently abnormal, especially in patients who give little attention to its proper care.

In anaemic patients, it is pale, thin, transparent, often showing with unusual distinctness the cutaneous veins and capillaries; in others it is harsh and dry and wanting in the resiliancy and pliability which we note in health.

In acute and rapidly progressing cases, having formerly enjoyed a good fat polster, the skin becomes flabby and loose, and in many instances of rapid emaciation I have seen it hang loose in large folds upon parts where the adipose tissue has been the thickest.

There are no characteristic skin eruptions belonging to the disease, but pityriasis versicolor and chloasma are noted more frequently in phthisical subjects than in others.

The occurrence of the former is favored by the application of poultices, fats and irritants to the chest, and also by the occurrence of night-sweats, conditions which favor the localization and growth of the parasites, especially if proper bathing and friction are not practiced. There is a predilection for its location upon the chest and neck. The yellowish or brownish spots extend and eventually coalesce with others, covering at times quite large, irregular surfaces, while eventually the affection extends to other parts of the body which are habitually covered with clothing. More or less itching may be complained of.

True pityriasis tabescenticum, or tuberculosorum, is quite different, both in cause and appearance. It is not a dermato-cycosis, but a trophic affection, and occurs in cachexias of various kinds. The patches do not show the discoloration of either pityriasis versicolor or of chloasma; they are small, rough surfaces covered with loose, dry epithelium, which is continually cast off; the affection causes no other symptoms.

Chloasma is simply a deposit of yellow or yellowish-brown pigment in the skin, and may occur upon any part of the trunk or extremities and upon the neck and face. In some respects it is the opposite of vitilligo, in which the naturally present pigment disappears. Curiously enough, I have had a patient under my care who had consulted a dermatologist for his facial disfigurement, and who, upon a cursory examination, mistook the case for one of vitilligo, the whole face and neck being involved, only smaller parts of the pale but normal skin being free, which were in striking contrast with the pigmented parts.

The patches in chloasma do not present desquamation.

Uffelman has frequently observed erythema nodosum in young tubercular subjects, especially when the serous membranes were the seat of disease, and he attaches an especially grave prognosis to the cases in which it is observed.

Erythema nodosum undoubtedly occurs with various cachexias, and the cachexias of phthisis may induce it. I have seen it occasionally in my patients, perhaps a dozen or thereabouts among upward of three thousand examined; in several of them it made its appearance in a comparatively early stage without proving of grave prognostic import.

The club shaped enlargements of the finger-ends with incurved, friable nails, a condition which sometimes also occurs upon the toes, is not only well known to physicians, but also to the laity, as of frequent occurrence in the course of phthisis, especially in slowly progressing, chronic cases.

As a rule, the soft parts and nails are the only structures involved, but in severe cases the bones and joints may participate in the enlargement.

The nail has usually a blueish or cyanosed appearance, and some authors claim that the condition is produced by local retardation or interference with the venous circulation.

It is not confined to phthisis, but may occur in chronic non-tubercular bronchitis, emphysema and heart disease, in fact with any affection tending to cyanosis, by reason of an obstructed pulmonary circulation. It has also been observed in persons enjoying good health.

The hair shows changes by becoming lustreless, brittle and splitting, falling out more rapidly than in health, the same as we observe in other wasting diseases.

Bed sores are not frequent in chronic phthisis, perhaps because comparatively few patients are bed-ridden for a long period of time. In those who become helpless and are obliged to keep their bed toward the end of the disease, the skin becomes red and abraded over prominent bony parts, but with proper care and change of position as frequently as may be needed, the skin rarely breaks through, and I have seen no open bed sores in my practice.

The teeth show a tendency to more rapid decay, even in an early stage, and especially in young subjects.

THE COMPLICATIONS.

The complications which arise in the course of pulmonary tuberculosis are chiefly inflammations of a pneumonic character and suppuration in cavities due to infection with other pathogenic microorganisms; extensions of the tubercular processes to other parts; degenerations and functional disturbances of various kinds.

When considering the various forms of phthisis, I have had occasion to refer to the frequent occurrence of catarrhal exudative pneumonia, and have distinguished between a course which is comparatively free from it, as the "chronic fibroid form," and another, in which pneumonic complications appear to largely govern the course and ultimate issue of the disease, and which I have described as the "catarrhal exudative form."

These incidental pneumonias differ in their cause from purely tubercular pneumonia. The latter is an inflammation peripheral to tubercles in an area of a dense eruption, by the close proximity of which the inflammation becomes confluent, and is therefore solely produced by Koch's bacillus; whereas the catarrhal exudative form is caused by so-called mixed infection, through the advent of the pus cocci, the pneumonia cocci and bacilli, the influenza bacillus, etc., in the lung tissue, which may or may not be the seat of tubercular disease.

These latter bacteria may, however, be present in the sputum, and may grow and multiply in the secretions of open cavities, without manifesting their deleterious effects, which occur only after they have penetrated the wall of a cavity, and have reached the peripheral lung tissue, or when sputum in which they are present is forced or aspirated through coughing, into adjacent or distant lung portions; in either case the catarrhal exudative pneumonic inflammations may result. Upon the interior of cavities and upon the bronchial mucous membrane, such bacteria may also maintain varying degrees of suppuration.

From bacteriological examinations it appears that a cavity once opened, and in free communication with the external air, is liable to become the seat of multiform bacterial life, and that the various bacteria supposed to cause mixed infections are often found present in the cavernous secretions. Nevertheless such patients show often marked amelioration of symptoms and general improvement, and no immediate harmful influence is noted with the advent of pathogenic bacteria in the sputum. The infected cavities often clean themselves rapidly, and the bacteria disappear, leaving a healthy granulating surface. Such observations have suggested the probability that although otherwise dangerous, the advent of bacteria which cause suppuration in cavities may serve a useful purpose by causing the breaking down and rapid expulsion of dead tuberculous tissue, and this being accomplished, the fibroid enclosure of the cavity becomes a barrier to their further penetration of the peripheral lung tissue, when with the disappearance of a favorable soil the pathogenic germs disappear and leave the cavity clean and ready to cicatrize.

Extension of the tubercular process to other parts and organs may occur at any period of the disease. In those which I now propose to consider, I do not include the pleura which is invaded by tubercle bacilli, or becomes involved in inflammatory processes so uniformly and as a rule in so early a stage, that I have included the pleural affection with the lung disease itself.

Although any part of the organism may eventually become the seat of tubercular disease and local and general miliary eruption of tubercles may occur at any time, some localities become more frequently involved than others in the course of phthisis. The upper air passages. including the ear, but especially the larynx, the intestine and abdominal lymph structures and the peritoneum, the pericardium and the genito-urinary organs, the brain and spinal cord, show secondary tubercular disease more frequently and perhaps in the order named.

TUBERCULAR LARYNGITIS.

I have never observed a case of primary tuberculosis of the larynx, but in a few instances the lung affection was slight or latent and could easily have been overlooked, the patient coming under my care on account of the laryngeal disease, without any suspicion that the lung was involved. While undoubted instances of apparently primary laryngeal tuberculosis are recorded, they are exceedingly rare and whenever tubercular affections of other organs are also present, we are uncertain as to which is the primary or secondary locality.

If such a differentation is, however, possible in manifest lesions, there is still a possibility of latent or healed foci being situated in parts inaccessible to diagnosis which may represent the primary focus. The usual post-mortem examinations are not so full and complete, as to absolutely assure the finding of all latent and smaller deposits, or of all structural alterations, due to latent or healed tubercular lesions; the primary lesion may have been limited and circumscribed, may have made but little or no progress, and may indeed have healed, while the secondary process caused more striking pathological alterations of a progressive character. Finally, we cannot know if the lesion considered secondary had any relation whatever to the supposed primary one; since the apparently more recent locality may in fact be due to a new and entirely independent infection from without.

The larynx is rarely the seat of tuberculosis in the early or incipient stage of pulmonary disease; in 150 histories I found that in all but nine cases evident destructive changes in the lung had preceded the extension to the larynx.

On the other hand tubercular laryngitis is very frequent in the last stages, and during several months preceding death the majority of cases of pulmonary tuberculosis present more or less extensive disease in this organ. But for the many far and hopelessly advanced patients which were declined admission into my institution, or who after a short stay were returned to their homes, my percentage of laryngeal tuberculosis would undoubtedly have been much greater.

The extension of the disease to the larynx may cause no subjective symptoms for a long time; I have had opportunity to observe slighter degrees of infiltrations upon the ary-epiglottic region and upon the posterior wall for several successive years causing no symptoms whatever and undergoing no material change, until with the advancing lung disease and general decline of nutrition the infiltrations increased or broke down.

The usual form of tuberculosis of the larynx is an infiltration of the deeper layers of the mucous membrane and of the sub-mucous tissues, in which the lymphatics and the glandular structures may be the primary seat. Infiltrations are more frequently found upon the posterior wall, the vocal cords and their processes, and upon the ary-epiglottic folds. In these localities they appear to show less tendency to break down into ulcers, while upon both the upper and under surfaces of the epiglottis we rarely find infiltration without ulceration.

An infiltration consists of a dense aggregate of tubercles, of the usual histological structure, and appears as a more or less circumscribed swelling covered by the intact, superficial layers of the mucosa. As long as the epithelial layer is intact the surface appears smooth and shining, and has an oedematous and often a yellowish red appearance.

As elsewhere the tubercles may undergo caseous or fibroid changes, and exceptionally they may become absorbed when the infiltration disappears. Usually the tubercles caseate and gradually penetrate the upper layer, the epithelium exfoliates and a whitish gray and subsequently more or less granulating ulcer is formed. At the edges and in the vicinity of such an ulcer we frequently note miliary tubercles or minute erosions.

The process may also extend to the deeper structures with, or without an ulcer forming on the surface, and cause infiltration and inflammation of the muscular tissue or perichrondritis.

When through ulceration the necrotic tissue has been discharged spontaneously, or when it has been removed mechanically, we often note a tendency to heal from the edges, but, as a rule, the newly formed tissue breaks down in one part while a tendency to heal may be evident in another, new tubercles frequently spring up, or the edges become undermined, defeating the process of repair. In isolated instances, however, such an ulcer has cicatrized entirely and permanently, and this has been observed to occur spontaneously.

Deeper infiltrations and ulcerations differ from a class of superficial ones, which result from the formation and breaking down of patches of miliary or sub-miliary tubercles in the superficial mucous layers. They may at times be seen in the vicinity of the deep ulcers, but they also occur independently, especially upon the ventricular bands, the true cords and the epiglottis. They show a much greater tendency to heal under simple astringent applications, but often we note the formation of new tubercles upon the excoriated surface when the underlying deeper tissues become infiltrated secondarily.

Tubercular tumors of the larynx have been described by various authors, but they are certainly of rare occurrence. In some instances reported they were as large as a cherry, and became detached and expelled with a violent fit of coughing. I have, myself, seen a few cases of tumor-like formations which appeared to be dense masses of granulation tissue growing from the true or false vocal cords.

The symptoms of tubercular laryngitis in the earlier stages are often obscure. In some patients it is a sense of irritation, tickling or scratching or a sense of fullness and pressure which produce a more or less constant desire to clear the throat. In others it is the change in the voice which first attracts attention. The change may come on abruptly without assignable cause, or it may appear after prolonged use of the voice, after a severe paroxysm of cough, or in connection with incidental catarrhal inflammation of the pharynx, when the voice becomes husky or fails entirely. The change in the voice may be only temporary and after some rest or after subsidence of the acute catarrh, it may improve again and become clear for various periods of time.

Pain is not, as a rule, an early symptom but belongs rather to an advanced state when ulceration and involvment of deeper structures have occurred.

It is always present in perichondritis, and is most severe when the ulceration involves the under surface of the epiglottis, and the posterior region of the ary-epiglottic folds, or when the ulceration extends upward from the posterior wall and involves the anterior wall of the oesophagus. With the latter occurrence there is often a considerable degree of swelling interfering greatly with the entrance of food into the oesophagus and the patient may be obliged to compress the nasal orifices to prevent the food being forced into the naso-pharynx. Inflammation of the perichondrium of the artytenoid cartilages also causes much pain to which the inflammation of the intermuscular connective tissue no doubt contributes. In all cases the pain is most severe and troublesome with the act of swallowing and it often radiates upward to one or both ears.

The swelling and ulcerations are often such, that the epiglottis closes imperfectly in swallowing, and small particles of liquid or of solid food are liable to be forced into the larynx causing the usual reflex irritation and cough; when such an experience is repeated it should lead to an examination of the larynx, even if there is no other symptom. In one such case where my attention was directed to the larynx by this symptom, the patient had experienced no other discomfort, but upon examination I found the epiglottis turban shaped, oedematous and the seat of a good sized ulcer.

In advancing cases the tubercular process extends and may eventually involve all of the interior surface; there are often varying degrees of oedema, or swelling through abscess formation in connection with perichronditis and the cartileges may undergo necrosis and exfoliation. The secretions of mucous, and the purulent discharges are then excessive and cause a constant irritation and desire to swallow, each act of which is attended with severe pain. The patient is often unable to take either liquids or solids, and the swallowing of each mouthful of semi-solid food becomes an actual torture.

When the epiglottis is seriously involved, it becomes practically immobile, and requires mechanical retraction if a view of the interior of the larynx is desired, there are instances in which the swelling of the epiglottis and ary-epiglottic region prevents inspection of the deeper parts entirely.

With the co-existing lung disease, the degree to which cough may be increased is difficult to estimate. In most patients there is no apparent relation between the cough and the degree of a laryngeal affection except when acute inflammatory changes occur in the larynx when the cough is more frequent. In the ordinary chronic course and even in the advanced stages of tubercular laryngitis the irritation seems to cause the patient to hawk and clear his throat rather than to induce actual cough.

Decided haemorrhage from the larynx is rare, slighter discharges of blood from granulating surfaces are more frequently observed.

The temperature is increased with acute, inflammatory complications, especially with perichondritis and the formation of abscesses.

In the earlier stages the laryngeal disease does not appear to have any influence upon the course of the lung affection, later, however. when there is abscess formation and fever, and when through painful deglution the amount of food taken by the patient becomes greatly limited, the emaciation and exhaustion progress more rapidly.

TUBERCULAR AFFECTIONS IN THE PHARYNX AND NOSE.

These are infrequent in the course of phthisis, and when they occur, it is as a rule in the advanced stage. Among something over three thousand cases that I have examined, I saw infiltrations and ulcerations in the pharynx in about ten or twelve instances. In three the ulceration appeared to be an extension from the epiglottis, affecting the pillars of the palate, and in one of these the left pillar and uvula as well as the epiglottis became entirely and rapidly destroyed; laryngeal tuberculosis was also present. This patient had numerous haemorrhages from the palatal vessels.

In two cases the ulcerations were confined to the posterior wall of the pharynx, while the larynx was free. In one other instance, there was a large tuberculous ulcer in the naso-pharynx, and upon the posterior ends of both turbinated bones.

In all cases the ulcerations were or became multiple, they caused much pain on deglution and there was little or no tendency to heal. Upon the soft palate the ulcers were accompanied with much oedema.

In the anterior nares tubercular ulcerations are more frequent; they usually follow a slow and chronic course. As a rule, they are not productive of much discomfort, more or less obstruction of the affected side and the formation of crusts are all that my patients complained of. The ulcerations are most frequently found upon the cartilaginous septum which often becomes perforated, and the destructive process may extend upward toward the bony septum leading to superficial caries.

In other instances the ulceration extends to the floor of the nostril and to the anterior portions of the turbinated bones which become swollen and covered with crusts. Occasionally ulcerations occur in the roof of the nose, when the fleshy tip becomes swollen and red, and superficial tubercular excoriations may form upon the upper lip. My records show a little more than one per cent. of tubercular ulcerations in the nose.

TUBERCULAR DISEASE IN THE MIDDLE EAR.

In the last 1000 consecutive records examined I found 32 cases in eight of which both ears were involved. Only one of these cases had tuberculosis in the naso-pharynx, in four others the larynx was also tubercular. In the other twenty-seven cases the upper air passages were free. The disease presents the symptoms of chronic otitis media, which in the tubercular form is characterized by freedom from pain. The loss of hearing comes on more or less gradually, and perforation of the drum head and discharge from the ear occur at times as the first symptom. If the disease extends to the deeper structures, dizziness is a more constant and annoying symptom, and as in other forms of deep-seated ear disease, especially when the osseous portions are involved, celebral complications are liable to occur. Two of the 32 cases cited died of tubercular meningitis. In all of my cases, the deafness was slowly progressive, and did not yield to treatment.

In every instance excepting one, the tubes were pervious and allowed of ready inflation, and with the necessary cleansing, the irrigating fluid readily reached the pharynx. The widely open tube, no doubt accounts for the absence of pain prior to the perforation of the drum, as well as for the occurrence of the infection. The exceptional case was the one with preceding ulceration in the vault of the naso-pharynx, where upward extension was probable. In every instance the lung disease had reached a phthisical stage before the appearance of the ear affection, and extension of the disease to the ear was most reasonably assumed to be due to the forcing into the open tubes of sputum with coughing, sneezing, etc.

In 31 of the cases, tubercle bacilli were found in the discharge, although in a number of instances repeated examinations were necessary for their demonstration.

TUBERCULOSIS OF THE GASTRO-INTESTINAL TRACT.

Tuberculous ulceration in the cavity of the mouth is a rare complication in phthisis. Apart from the tongue we see it usually in the last few weeks of life when miliary eruptions may occur, and break down very rapidly; the mouth becomes extremely sore, and little, minute ulcers are found on the cheeks, gums, palate and under the tongue.

The tongue, however, may show tubercular infiltrations and erosions in a much earlier stage. I have found it the seat of deep infiltrations or ulcerations in only five of all my phthisical patients, and in all of these it proved one of the most painful and distressing complications, causing much pain in eating and often in swallowing, with at times profuse discharge of saliva and mucus. This number does not include the more frequent, isolated miliary or sub-miliary tubercles of which I have seen at least twenty instances, and which are evidently due to sputum infection. The latter are usually seated at the tip or lateral edge of the tongue occasionally opposite a carious tooth. The tubercle granule breaks down and leaves a very sensitive surface, which unless in very cachectic patients usually heals under appropriate treatment.

Tubercular disease of the oesophagus and of the stomach have occasionally been described. I have seen the anterior wall of the oesophagus implicated in extension from the posterior wall of the larynx, but have never seen a case which suggested tubercular ulcer of the stomach.

Intestinal tuberculosis makes its appearance most frequently in the far advanced stages of phthisis, I have seen but few examples in my practice where the intestinal disease occurred before the advent of expectoration of tuberculous sputum from the lungs.

Owing to the difficulties and uncertainties in diagnosis the frequency of this complication in phthisis is difficult of determination intra vitam, and all practitioners of much experience with consumptives must have been surprised by finding post-mortem quite unexpectedly extensive tubercular ulcerations, especially of the small intestine, which caused little or no symptoms during life, or by their absence when obstinate bowel symptoms and uncontrollable diarrhoea had apparently justified the assumption that such lesions were present.

From my own observations it appears that ordinary catarrhal affections with inflammation of the intestinal follicles and glands, and erosions or catarrhal ulcers, favor localization of the tubercular process in the intestinal mucous membrane; and that without such favoring conditions infection of intestinal mucosa is very rare. Otherwise it would be most remarkable that intestinal tuberculosis does not occur in almost all cases, especially when we consider how many tubercle bacilli must reach the stomach and bowels, in patients who for months and years expectorate infectious material, and even in such who never consciously swallow their expectoration.

Formerly we explained this apparent immunity of the intestinal tract by the supposed germicidal action of the free hydrochloric acid in the stomach, but more recent observations and experiments appear to show that the slight percentage of free acid in the stomach has no such influence. When infectious material is introduced through the stomach of rabbits or guinea pigs, generalized tuberculosis with or without local disease of the abdominal lymphatics and glands occurs, but the mucous membrane of the bowel itself usually escapes. Again, when virulent tubercle bacilli are exposed in vitro to the action of the gastric juice or to the action of an equivalent per cent, of free hydrochloric acid, under conditions which correspond as nearly as possible with those present in the human stomach, the germs do not lose their virulency, but remain infectious as before.

The animal experiments show, however, that virulent tubercle bacilli are actually absorbed from the gastro-intestinal mucous surface, without producing local lesions, and considering their size, there is nothing remarkable in this fact, but it is remarkable that the mucous membrane itself remains free for so long a period during which bacilli from expectoration adhering in the cavity of the mouth and pharynx are swallowed in large or smaller number, and pass through the intestine with its other contents, daily for months and years, and that only a very few phthisical patients acquire tubercular lesions of the mucous membrane, unless in the far advanced stages.

This apparent immunity is also observed in the upper air passages and especially in the pharynx and mouth where tubercular disease is the rarest, while opportunity for infection appears to be most frequent in the course of phthisis. In the mouth more particularly, the opportunity for infection would seem to be favored through abrasions and other injuries to the mucous membrane, from mastication of hard food, erosions from carious teeth, etc., and making due allowance for the motion of the parts in the mouth and pharynx and for the frequent passage over their surfaces of food and drink, which, like in the stomach and intestine, must naturally hinder the localization of the germs, these conditions are absent in the larger bronchi and trachea, and yet we rarely see ulcerations in these, until a late and cachectic stage of phthisis has arrived.

It appears therefore that mucous membranes, while allowing the absorption of the germs into the lymph channels, seem to be protected from tubercular localizations more than we would naturally expect, for the explanation of which, the mechanical protection of the natural secretions and their possible germicidal properties, is all that can be offered. The presence of abrasions and exfoliation of the epithelial layer must undoubtedly favor infection; more frequently, however, we find that the sub-mucous lymphatics are primarily involved and that the formation of tubercles takes place here first, the tubercles penetrating the mucous membrane later. We see this to be also true of the deep infiltrations of the larynx, pharynx, and the intestinal ulcers appear to form in the same manner.

The lymph follicles and lymphatics of the mucous tissue are frequently the seat of irritation and inflammation, and this is the case with every intestinal catarrh. With such inflammation these structures become swollen and frequently remain hyperplastic, conditions which favor the retention of germs that otherwise would enter the lymph stream.

We find therefore that tuberculous ulcers of the intestine have their origin most frequently in the lymph follicles and sub-mucous lymphatics. In the early stage they present the usual round cell infiltration with giant cells, which subsequently caseates and breaks down. Intestinal ulcers are most frequently found where the follicles are most abundant, in the lower part of the ileum and in the vicinity of the ilio-coecal valve; subsequently they extend and enlarge by coalescence of several broken down follicles and by implication of adjacent tissues. The sub-mucous tissue usually forms the floor of the ulcer, eventually inflammatory and cicatrizial changes may occur in the muscular layer and in the peritoneal covering. Miliary tubercles may form in these deeper tissues, and they are at times found upon the free peritoneal surface, leading to infection of the peritoneum with symptoms of circumscribed or general tubercular peritonitis.

If the intestinal ulcer extends, it usually assumes an oblong or circular form, transverse to the lumen of the bowel, and like tubercular ulcers in other localities they frequently show a tendency to heal and to cicatrize. Occasionally such ulcers heal entirely; leaving a well-marked cicatrix, and if the entire circle of the bowel has been involved the cicatrizial contraction may give rise to stricture, causing in rare instances complete obstruction.

More frequently they heal only partially and show a tendency to extend in one direction while cicatrization occurs in another. The ulcerations are as a rule multiple.

The clinical symptoms are often obscure, and the obstinate diarrhoea which is at times observed in the last stages of pulmonary tuberculosis is by no means a certain indication of intestinal tuberculosis.

In the small bowel multiple and large ulcers may exist, without causing diarrhoea or other well-marked symptoms, but when there is beginning stricture, we usually note circumscribed, griping pain, with the motion of the bowels. The evacuation may be otherwise quite normal, or a formed stool is followed by a partially more liquid discharge. Palpitation of the abdomen elicits tenderness or pain upon pressure in a particular locality, as the neighborhood of the coecum; if griping is complained of the tender or painful spot corresponds to the area where the griping pain is most acutely felt.

Griping pain may also occur independently of the movement of the bowel, particularly after eating of solid food, corresponding to the increased peristalsis of the bowel at that time. In several cases I have seen the suffering to become so severe that it produced partial collapse; one patient absolutely refused food unless he were given a hypodermic of morphia before eating.

On account of accompanying circumscribed peritonitis the pain may become exquisite without pressure, when it is also increased by coughing, deep breathing, change of position in bed, etc.

Such inflammatory complications on the part of the peritoneum give rise to exudates and subsequently we find evidence of circumscribed indurations and thickening from adhesions over the diseased part of the bowel.

When the coecum and ascending colon are the seat of tubercular ulceration, diarrhoea becomes a more prominent symptom, the stools become quite thin and watery, and often contain mucus and blood. I have now a case of this kind under observation in which copious haemorrhage from the bowel has frequently occurred; the otherwise liquid stools vary from three to twelve or more in twenty-four hours, and are attended with most severe griping. The diarrhoea appears most troublesome after midnight, the patient is at times absolutely unable to control his bowels, involunatry discharges overtaking him despite every effort on his part to prevent them. This patient shows marked and sometimes exquisite tenderness over the ilio-coecal valve, and ascending and transverse colon, and also in the vicinity of the umbillicus.

When the ulcerative processes become extensive symptoms of a typhoid state intervene, the tongue becomes dry, there is constant thirst, emaciation becomes extreme and toward the end the patient's mind wanders, but he is still aroused by the pains whenever food is given.

The Rectum is occasionally found to present tuberculous ulcers, which I have most frequently found near the internal opening of a rectal fistulae. In five cases, however, no fistula was present, in all but one of which the examination was made on account of occasional diarrhoea, with rectal pain, or because blood appeared with formed stools, suggesting the presence of internal haemorrhoids. One patient, however, that came under my care several years ago presented most extensive ulceration upon the permanently prolapsed rectal mucous membrane and for several inches upward; tubercle bacilli were readily found both in the caseous material removed for examination and in the purulent discharge. The rectal disease in this case appeared to be primary, or at least it had no connection with the slight and latent deposit in her right lung.

Rectal Fistula occurred in 4 per cent. of all my clinical material. In cases in which I observed the evacuation of preceding peri-rectal abscess, I found tubercle bacilli in all but a few, while in the discharge of old fistulae tubercle bacilli were found in about one-half, and then, at times, only after repeated examinations.

When first using Tuberculin in doses which produced reactions, I found tubercle bacilli in the discharge from a number of old fistulae in which preceding microscopical examinations had been negative.

TUBERCULAR PERITONITIS.

When occurring in the course of phthisis it is most frequently an extension from tubercular processes of parts covered by peritoneum, and excepting cases of general miliary tuberculosis, I have never seen a case where extension from subjacent structures was not the reasonable explanation for its occurrence.

The inflammation is most frequently of circumscribed form, but it, as well as the general form, appears to have preceded the pulmonary disease in one-third of my cases. The most frequent extension seemed to be from mesenteric and retro-peritoneal tubercular glands; next frequent from the intestine, the female pelvic organs, the tubes and ovaries, occasionally from the kidneys, bladder and the pleura. Of fifteen consecutive cases of general tubercular peritonitis ten were women; of sixty-nine cases showing circumscribed peritoneal inflammation in the course of phthisis, there were thirty males and thirty-nine females.

The general form is usually chronic with more or less acute extensions or recurrences of the inflammation. Usually the process is first circumscribed, and extends at intervals; this was the case in all instances but one where the peritonitis became general while the patients were under my observation. In this exceptional case the diagnosis was doubtful for two days and leaned toward intestinal obstruction, of which all the usual symptoms were present, and on this diagnosis the abdomen was opened for the purpose of giving surgical relief. The whole peritoneal surface was, however, found closely studded with miliary and sub-miliary tubercles, presenting evidence of acute inflammation, and the pelvis contained a serous bloody exudate.

More or less ascites was present in one-third of my cases of general peritonitis; in one case the exudate was purulent, in the others no liquid exudate could be made out during the life of the patient. Excepting with acute exacerbations or extension there was but little spontaneous pain; in the cases with acites pain was either absent entirely or it was insignificant. In most cases, however, pain was complained of on pressure, or with defaction, and especially when enematas were given.

In prolonged chronic cases where the exudate is chiefly fibrinous, adhesions and contractions of the messentery and omentum give rise to large hard, nodular masses, usually situated in the umbillical region and easily palpable through the abdominal wall. Upon abdominal pressure and manipulation we note gurgling and splashing from fluids and gases in the small intestine, and more or less obstinate constipation is usually present.

Nausea and vomiting, while observed in the more acute forms and with exacerbations, are not so severe and troublesome as we find them in other forms of peritonitis.

The other general symptoms are more or less obscured by those of the pulmonary disease, and it is often difficult to judge in how far the fever and frequency of the pulse may be attributed to the complication. They are, however, increased with acute attacks, even of the circumscribed form. The suppurative general form leads to a typhoid state with rapid exhaustion.

The circumscribed form may simply lead to localized thickening and adhesions which may be made out by palpitation after the pain and tenderness have disappeared. It may also extend and involve larger areas. There is often but little general disturbance, and many cases are undoubtedly never diagnosed, especially if there are no further extensions. What increase in temperature there is, usually subsides in a few days and the pulse returns to its previously observed frequency.

It should, however, be borne in mind that all peritoneal inflammations that occur in the course of phthisis, although appearing as an extension from a tubercular part or organ, are not necessarily attended with the formation of tubercles, but that they may be due to other pathogenic micro-organisms, or irritants capable of exciting inflammation.

TUBERCULAR PERICARDITIS.

This has been of rare occurrence in my own practice. It cannot be differentiated from the non-tubercular form during the life of the patient excepting in the rare instances where the removed exudate shows the presence of tubercle bacilli. In the absence of other apparent causes, when pericarditis occurs in the course of pulmonary tuberculosis, especially of the left lung, we naturally associate it with the lung disease; but I have seen at least three instances in which the pericarditis was recovered from, and which in the light of the uniformly fatal aspect of the tubercular form, must have been due to other causes. In another case the pericardial inflammation was of septic origin and septic endocarditis was also present; and in still another the ulcerative process of an adherent lung cavity had perforated the pericardial sac, giving rise to pneumo-pericardium; death occurred on the second day under the erroneous diagnosis of partial pneumo-thorax, the true diagnosis being made at the autopsy. The pericardium was found the seat of tuberculous infiltration where it was adherent, and a few miliary tubercles were found upon the serous coat in the vicinity of the perforation.

In all the cases recorded in medical literature which occurred in the course of chronic phthisis extensions from the left pleura and from mediastinal tuberculous glands are the most frequent, but exceptionally caries of the sternum, ribs and vertebrae were found to have been the connecting link through which the pericardium became involved.

The symptoms do not differ from other forms of pericarditis and consist of more or less pain in the region of the heart, palpitation, and pressure from the effusion. If the latter becomes considerable, there is displacement of the lungs, of the great vessels and of the diaphragm; characteristic for the tubercular form is the chronic and uniformly fatal course.

TUBERCULAR ENDOCARDITIS.

Acute endocarditis may also occur in the course of phthisis. It is most frequent in acute miliary tuberculosis, but a true diagnosis of its tubercular character is impossible during the life of the patient.

Heller, Fraenkel, Lyden and others have reported cases in which the tubercular nature of the affection was demonstrated at the autopsy.

I have records of six cases in which endocarditis occurred in the course of chronic phthisis, in patients who presented no rheumatic history, and in which sepsis was also excluded. The disease was insidious in its beginning and subsequent course, but the valvular disease exerted a decidedly unfavorable influence on the progress of the lung disease in all but one. The mitral valves were chiefly involved in five cases, and in one the mitral and aortic valves became insufficient in succession with rapid dilation of the left ventricle. In this case oedema of the extremities occurred in the fourth week, which was quickly followed by oedema of the lung.

In five of my cases the unfavorable course of the lung disease after the advent of endocarditis was unmistakably attributable to the heart complication. In the sixth case endocarditis occurred early, and at a time when there were no active symptoms in the lung; pleurisy, first on one and then on the other side, appeared in this case about two months after the onset of the endocarditis, but the circulation was well maintained, and the patient made a sufficiently good recovery that she was subsequently able to pursue her occupation of a nurse; a slight regurgitant murmur with moderate hypertrophy of left ventricle was present when she was last examined.

My limited experience, therefore, coincides with that of other observers, that pericarditis and endocarditis are usually fatal complications in phthisis, and that their occurrences becomes the more rapidly fatal the more advanced the patient appears to be in the lung affection.

Valvular disease existing prior to the advent of pulmonary tuberculosis has not appeared to me to have an unfavorable influence upon the course of the lung disease. I have observed quite a number of such cases, but in all of them there was a fair degree of compensatory hypertrophy, whereas in endocarditis, which develops in the course of phthisis sufficient compensatory hypertrophy does not readily occur, especially if the patient is already much exhausted from the lung disease. On the other hand, the old notion that valvular disease of the left heart is a protection against pulmonary tuberculosis is certainly erroneous.

TUBERCULOSIS OF THE GENITO-URINARY ORGANS.

This complication was diagnosed in 49 of my cases, there being no apparent difference of frequency in the sexes. In the 25 male patients the involvement of the organs, apart from their lung disease, was as follows:

Testicle alone	2
Testicle and bladder	2
Testicle, prostate, bladder and kidney	1
Prostate and bladder	1
Urethra and prostate	1
Kidney alone	8
Kidney and bladder	6

In all cases in which the testicle was involved this organ was the first one to give evidence of tuberculosis, and these, together with two other cases where the prostate and bladder and urethra and prostate were tubercular, may be taken as belonging to the ascending variety; while the fourteen cases in which the kidney and bladder were tubercular might be supposed to be of the haematogenous or descending form.

In two of the cases, in which the kidney alone was involved, the vesical symptoms were so prominent that I was much surprised when the surgeon to whom they were referred by me on account of tuberculosis of the bladder, reported that upon cystoscopic examination the bladder was found free of tuberculosis and that the real seat of the disease was the kidney. I have no doubt that in many instances like errors, as occurred to me, happen to other practitioners when the cystoscope is not employed.

In the case in which the prostate, bladder and kidney were found diseased the kidney symptoms were greatly masked by those of the bladder, and the fact is, that but for a severe attack of nephritic colic, which the patient had on the first night of his arrival in Asheville, I should not have suspected the kidney affection for the time being, neither had his former physician recognized it.

In the 24 female patients the involvement of organs was:

The kidney alone	3
The bladder alone	2
The kidneys and bladder	4

Tubes and uterus	3
Uterus and vagina	1
Tubes or tubes and ovaries	12

I must, however, say that in the 12 cases of tuberculosis of the tubes or tubes and ovaries the diagnosis was not absolutely certain, and depended upon the presence of enlarged nodular tubes, or ovaries or both, in several instances with co-existing tubercular peritonitis. The patient who had tubercular disease of the uterus and vagina, had however, no other discernible pelvic lesion, the tubes were both free, and the ovaries showed no enlargement and were freely movable.

Of the three cases in which the tubes and uterus were tubercular the diagnosis was confirmed in two, by the presence of tubercle bacilli in the caseous detritus removed with the curette; in all three cases, however, the tubal disease appeared first, and attacks of pelvo-peritonitis had preceded the uterine symptoms for considerable periods of time.

Taking the cases of kidney and bladder tuberculosis, the clinical history speaks for the first involvement of the kidneys, and in the case in which the bladder only appeared to be affected, it is not impossible that the kidney also was involved. This case was seen by me fourteen years ago, when the opportunities for correct diagnosis were not as good as they are now; but even with our present knowledge and resources in diagnosis, the kidney affections, especially when the cortical and pyramidal portions are the seat of the tubercular disease, are at times extremely difficult of recognition, and there are cases which present no symptoms whatever until a tubercular abscess penetrates the renal pelvis or a collecting tube. In one of my cases the first symptom was renal haemorrhage, with colicky pains down the ureter, and in another case the disease was discovered by the persistence of cloudy urine with mucous masses containing small blood clots, before the patient had any other symptoms whatever, the examination of the urine having been made as a routine matter on admission. In a third patient there was no other suspicion excepting a rapidly progressive change in color to a peculiar pallor which makes one think of the kidneys; the urine was perfectly normal, but the left kidney was found distinctly enlarged and tender as compared with the right. This patient soon developed hectic fever, which lasted several weeks, without any apparent changes in his lungs to account for it, when suddenly he was seized with a most violent renal colic, and the following day the urine contained blood, pus and tubercle bacilli, and the hectic fever then disappeared.

Apart from the miliary form affecting both kidneys, which is a part of general miliary tuberculosis, and which produces no symptoms, we can distinguish two principal varieties, one in which the tubercular process is primarily seated in the cortical substance with isolated caseous centres, which may produce pain in the loins, and may give rise to some enlargement. Otherwise there are no striking symptoms until softening and abscess formation take place. Occurring in connection with pulmonary phthisis the resulting fever may be referred to the lungs, and the first symptoms that enable a fairly positive diagnosis occur therefore as a rule only with the advent of destructive processes and evacuation of the abscess directly or indirectly into the renal pelvis.

In the other class the renal pelvis appears to be primarily involved while the parenchyma of the kidney is still intact; this would be particularly the case in the ascending variety and my clinical histories, although not numerous, seem to corroborate this view. While with the former class the kidney disease may remain obscure, until by the formation and discharge of an abscess more violent symptoms are induced, in the primarily pelvic variety the presence of cloudy urine, and its microscopic examination direct attention to the disease at a relatively early period.

In either form, however, the chief symptoms become eventually those of pyelitis, which subsequently leads to catarrhal inflammation of the bladder; and if the kidney symptoms have been overlooked, we naturally give our chief attention to the vesical catarrh.

The symptoms of actual tubercular ulceration of the bladder are also those of chronic cystitis, and in some of the cases that I have seen, they reminded me very much of vesical calculus. The pain does not, however, stand in relation to exercise; micturition is more frequent, especially at night; the urethral pain disappears more quickly after the bladder is emptied, and with the often following painful tenesmus a few drops of blood or pus come away. The urine becomes permanently alkaline and triple phosphates appear in the sediment and tubercle bacilli may be found.

The symptoms on the part of the prostate were chiefly those of a sense of fulness and pressure in the rectum, with more or less frequent attacks of rectal and vesical tenesmus. The prostatic enlargement was moderate in all my cases, showing firm nodules, and at times soft fluctuating spots. Perforation into the rectum, the urethra or into the bladder may occur.

The case of tubercular ulceration of the urethra with subsequent extension to the prostate gland is perhaps of sufficient interest to describe more fully, especially as it appeared to be a primary infection.

Mr. W., age 34, brought his wife to the Winyah Sanitarium in the summer of 1893 on account of her pulmonary phthisis. This gentleman consulted me during his stay on account of a muco-purulent discharge from the urethra, which had existed for several months, and for which he was using astringent injections.

Believing the affection to be gonorrhoeal no special investigation was made at this time, but, returning several months later on a visit to his wife, he consulted me again, stating that he had not improved, and that the discharge had been bloody on several occasions, assuring me that if he had contracted the disease in coitus, it could only have been from his wife; the latter was examined with the result that an ulcer was found upon the fourchette, the vagina was normal, and the uterus slightly enlarged, somewhat tender and discharging bloody pus. This pus was examined for gonococci, but none were found; instead we found in another specimen quite a number of tubercle bacilli, leading to the diagnosis of tubercular endometritis.

From the ulcer in the fourchette, although typical in appearance as tubercular, we could get no bacilli. A number of successive examinations of the discharge from Mr. W.'s urethra were negative, both as to gonococci and tubercle bacilli; after several weeks of negative results a sound was passed, upon the withdrawal of which about ten drops of bloody pus followed, in which, after prolonged search, a few typical tubercle bacilli were found, and a like result was obtained upon subsequent examinations.

Several months later Mr. W. returned again to Asheville, and now complained of rectal and vesical tenesmus, his urethral discharge continuing as before. Examination of the prostate gland showed a nodular mass in the left side and considerable swelling and tenderness.

This patient's family history was good, he was a man of splendid physique, and under the circumstances related, there could be little doubt that he contracted a tubercular urethritis from his wife, which subsequently involved the prostate. The source of the infection of the genitals in Mrs. W.'s case was from her sputum, an assumption which the confidential statements of both husband and wife fully justified.

Tubercular disease of the ovaries, tubes or of the uterus, may cause but slight symptoms, and in the earlier periods they are frequently referred to menstrual disorders, unless the occurrence of pelvic peritonitis leads to local examination.

In addition to these cases in which I felt that the diagnosis of tuberculosis was justified, I have observed quite a number of cases of circumscribed pelvo-peritonitis in phthisical females, but local examinations were either not made, or were negative, as far as showing any enlargement or disease of the uterine adnexa.

These cases are therefore not included, and although in most of them it could be presumed that the inflammation was an extension from the female pelvic organs, it could not be satisfactorily established that the latter were the seat of tubercular disease.

TUBERCULAR MENINGITIS.

This complication may occur in the course of pulmonary tuberculosis as in other tubercular affections; it is more frequent in childhood than in adult life. My eleven patients, with two exceptions, were, however, all adults, and all died.

In four additional cases there were symptoms which caused strong suspicion of meningitis, but the disease did not fully develop, and amelioration with gradual disappearance of the nervous symptoms took place, and therefore the diagnosis was reconsidered.

I do not believe that recovery occurs when the disease is so far established that the symptoms are unequivocal, but it is of course possible that in cases where there are but limited areas of the tubercular disease a recovery may take place, or that the meningitis is not tubercular, and some of the four cases above mentioned may have belonged to this class. The relation of one of these cases in which the symptoms were most pronounced may be of interest.

Miss D., aged 22, suffered from pulmonary tuberculosis in what is usually considered the second stage; both upper lobes were involved, and a cavity existed in the left apex; her case pursued a rather favorable course, she was gaining in weight, her temperature had become nearly normal and her symptoms were quite moderate. In connection with her menstrual periods she often suffered from headache, and a similar headache, only more intense, made its appearance again with the advent of the menstrual flow. Contrary to past experiences, the headache did not subside this time, but became more severe and continuous; she became constipated and very irritable, lost her appetite and frequently vomited her food without apparent cause. This condition lasted for a week after the menstruation had ceased and despite appropriate treatment of her symptoms. Her temperature had gradually increased so that it varied between 100 and 101.6 F. daily.

Examination of the chest revealed no material change; the patient's complaint of the headache became very great, she slept restlessly, muscular twitchings and more sudden muscular contractions caused her to awake frequently; at intervals she talked and muttered in her sleep.

Vomiting occurred several times a day, without warning, and considerable tenderness appeared over the cervical vertebrae; her neck became stiff and slightly retracted. There were no changes in the pupils; the pulse was 60. Under these symptoms I thought the diagnosis of meningitis justifiable, and made my prognosis accordingly.

This stage had been reached on the sixteenth day from the advent of more severe headache and vomiting, and her condition continued unchanged until the twenty-first day, when the entire day passed without vomiting, and with retention of about three pints of milk and some broths; from now on she improved rapidly; the tenderness over the cervical and upper dorsal vertebrae became markedly less, she began to move her head better, the muscular twitchings grew less, vomiting occurred only occasionally, and the headache diminished; on the twenty-fifth day there were no symptoms left except slight headache; the temperature did not exceed 99° F., the pulse varied between 70 and 96. She thereafter continued to improve, but did not lose her headache entirely for five or six weeks.

The above is undoubtedly the usual clinical picture of tubercular meningitis, occurring in some cases perhaps more rapidly, which are usually followed by retraction of the abdominal muscles, and by increasing pressure symptoms on the part of the brain, leading to more or less paretic states of various groups of muscles, stupor, and finally to complete paralysis, when the patient dies in a state of coma.

TUBERCULOSIS OF THE JOINTS.

Extension to any of the joints may occur in the course of the pulmonary disease. In the greater number where joint and bone affections are associated with tubercular disease of the lungs, the latter is secondary. With few exceptions my patients were all adults, and at a period of life when joint affections are rare as compared with the period of childhood. The knee joint was involved in five, the hip in two, the wrists in two, the elbow in one, the spinal column in two. In four of these cases the history showed that the joint disease existed long before there were any pulmonary symptoms; in three other cases extension to the lung had followed upon surgical measures.

TUBERCULOSIS OF THE EYE.

This is an infrequent complication of the lung disease, especially in adults. In young children, however, the so-called scrofulous affections of the lids and conjunctiva are frequently found to be tubercular, and the few cases, which I have seen since the advent of tuberculin, showed reactions to trial doses, and the local disease was favorably influenced and was recovered from under its therapeutic use.

In adults I have observed tubercular ulcers of the cornea, or at the edge of the cornea involving the ocular conjunctiva and sub-conjunctival tissues, in only four instances; and with the exception of one case of solitary tubercle of the iris and of two cases of miliary eruptions of tubercles in the choroid and upon the iris, in connection with tubercular meningitis, I have seen no tubercular complication of the eye.

TUBERCULOSIS OF THE LIVER AND SPLEEN.

Such extensions from the lungs are rarely observed. Recent miliary tubercles are at times found, in post-mortem examinations, in the liver and spleen, but they usually represent part of a general miliary eruption which sometimes occurs shortly before death.

An interesting case in which tuberculosis of the liver appears to have been present in an early period was that of a man aged 55, who had been addicted to alcohol. A moderate degree of cirrhosis of the liver had been diagnosed by his family physician, and subsequently this diagnosis was accepted by me also. His pulmonary disease seemed to have appeared several years after his liver symptoms had been the object of professional advice, and while under my care for his lung affection, I noticed a gradual development of acites, which was not attended by either pain or tenderness, and the cause of which I referred to the cirrhotic liver. After this the patient was returned home, where he died a few months later.

The autopsy, the details of which were supplied to me by his physician, showed extensive tubercular changes, including several large solitary tubercles with more or less fibroid degeneration and encapsulation, together with fatty degeneration, in the liver. Perihepatitis, caseous tubercles in old adhesions between the liver, diaphragm, omentum and intestines, and scattered tubercles upon the peritoneum were also found.

According to his physician, there was every evidence that the liver disease was tubercular from the beginning, and that the theory of alcohol cirrhosis had been entirely erroneous.

ACUTE MILIARY TUBERCULOSIS.

General dissemination of the tubercular process is seen most frequently in the far advanced stages and in connection with destructive processes, when infectious material enters the arterial circulation, perhaps through the pulmonary veins.

Post mortem we find the lungs, the serous and some of the mucous membranes, the lymph glands, the kidneys, the choroid and iris, the liver and the spleen the seat of gray, translucent miliary tubercles, in varying states of degeneration.

The clinical symptoms are high continued fever (103 to 106° F.) a pulse rate between 120 and 150 and increase of the respiration to 40 or even as high as 60. After several weeks the fever becomes hectic, the patient drifts into a typhoid state and dies of exhaustion usually between the sixth and seventh week. Functional disturbances occur in all the involved organs; local examination of the lungs shows rough, puerile, or weak respiration, catarrh of the smaller bronchi, without apparent cause for the rapid respiration.

In far advanced cases the high fever and rapid respiration are the chief evidences of the general infection, but as these symptoms may be present from pneumonic complications, and as the patient usually dies in the course of the first or second week, the miliary eruptions may not be suspected during life.

AMYLOID DEGENERATION.

Apart from the extension of the tubercular process to other organs, most of which have been considered, we note certain incidental affections which materially influence the course of phthisis after their occurrence.

These are chiefly amyloid and fatty degenerations, which have long been familiar as occurring with chronic tuberculosis of the lung, with syphilis and witb other diseases where there is long continued suppuration.

Amyloid degeneration is really not a degeneration, but an infiltration of a peculiar substance resembling albumin, of a wax-like appearance, which among other chemical properties gives a peculiar reaction with a solution of iodine and iodide of potash, of a dark brown mahogany color.

Iodine with sulphuric acid gives a blue reaction upon the cut surface, but this test is not reliable, and is only of interest in that it caused Professor Virchow to believe that the infiltrated material was a true degeneration of the normal tissues, resembling starch.

As already stated, the infiltration is not peculiar to tuberculosis, and while it occurs in the later stages of chronic cases, it is more frequently observed in connection with syphilis. The process begins first in the walls of capillaries and gradually involves the adjacent tissues, giving them a waxy, transparent appearance, thickened, indurated and quite hard to the touch.

This pathological alteration usually involves several of the abdominal organs, the liver, the spleen, the kidneys and intestines, and exceptionally the stomach and even more distant organs may share in the process.

The condition of the liver and spleen may first attract attention, not because of any subjective symptoms, but rather on account of a sense of fullness or pressure due to the moderate and uniform enlargement which can be made out by percussion and palpation. At the same time a decided pallor of the skin appears. When the kidneys are involved, there is albuminuria, without any other evidence in the urine as to inflammatory changes, and oedema soon appears extending from the ankles upward. The lung symptoms may abate more or less, and I have seen patients who flattered themselves on their improvement, on account of diminished cough and expectoration, and on account of the observed increase in weight, from the rapidly increasing anasarca.

Sooner or later the intestines become involved, and at times the accompanying painless watery diarrhoea is the first symptom to attract attention and leads to the discovery of the alterations in the liver, spleen and kidneys.

FATTY DEGENERATION OF THE LIVER.

The fatty changes in the liver which are observed in pulmonary tuberculosis are not infiltrations of fat, which occur from excessive ingestion of fat and hydro-carbons, but are a true degeneration, perhaps from deficient oxygenation, to which the frequently excessive use of alcohol in the last stages and the presence of toxic products from disintegrated tissue in the blood may also contribute.

In post-mortem examinations fatty degeneration of the liver is comparatively frequent. The slighter degrees are, as a rule, not recognized during the life of the patient, because there are no distinctive or prominent symptoms directing attention to the liver. When frequent physical examinations of the chest are made in which the liver is regularly taken into consideration, and if its limits are carefully determined, we may detect the early stages of enlargement, and often palpate its soft, roundish, projecting border, before the size has increased, that it projects permanently several inches below the ribs. Despite of this enlargement in breadth, the liver is not correspondingly increased in thickness, and percussion over it brings out the sound of the underlying colon quite readily.

When the enlargement has become considerable, the patient complains of a sense of discomfort, and of pressure in the right hyprochondrium. The faeces become usually light in color; alcoholic excesses are particularly prone to induce congestion of such a fatty liver, which gives rise to considerable pain from distension of its capsule.

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ORIGINAL CONTRIBUTIONS.

THE EDUCATIONAL AND LEGISLATIVE CONTROL OF TUBERCULOSIS.

BY CHAS M. DENISON, A. M., M. D., DENVER, COLORADO.

THE DEGENERATIVE RESULTS OF DEFICIENT VENTILATION.*

INTRODUCTION.

The idea that a known (?) disease like tuberculosis springs from the evolution or rather dissolution of the forces which have to do with our being, that it is an evidence of the VARIATION of the law of HARMONY TO ENVIRONMENT, a retrograde movement towards dissolution and death; this idea, I say, of a basis law of degeneracy, which finds its chief expression in this wasting disease, is too profound to be easily grasped, too adverse to our set habits of thought to be easily accepted. Therefore, if I fail to convince the hearer in a necessarily curtailed presentation of proof, let me suggest that he simply suspend judgment till the opportunity happily occurs, for him to study John Fiske's "Outlines of Cosmic Philosophy," especially the interesting chapters on "Matter, Motion and Force"; "Rythm", "Evolution and Dissolution" and the "Sources of Terrestial Energy." Then I think he will come to the same conclusion here reached and have a clearer understanding of this matter.

There is a deeper and more fundamental source of knowledge than that which the microscope with its wonderful delineation and detail can supply, and the liability of being side-tracked by that instrument's findings should be recognized, that we may not fail to grasp the true origin of our degenerative diseases and their evolution.

An important fact in evolution is that, all the way up to man, the beings evolved have had no voice, save instinct, in deciding their destiny. With the advent of man, however, there was something added to the law of the survival of the fittest; that is, a deciding brain. This higher order of life,—the soul of man with its Godlike attributes,—involves not only equivalent responsibility, but the possibility to mistakes because of that responsibility. I am not a preacher to expound and lament man's moral errors, but of all his physical ills the profoundest and most far-reaching mistake which we now have to analyze is known through its results in the disease TUBERCULOSIS, the lately termed "white scourge" of the race. Let us try to free our minds from preconceived beliefs, and, rising above the details of bacillary evidence, try to determine in how far man himself is to blame for his miseries; then try to learn how the punishment of this scourge is as it should be in the Divine order of our creation and our evolution. Thus we may come to realize that tuberculosis springs from the mistaken adaptation of man to his environment, i. e., is chiefly due to the faulty civilization of the present time.

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*Read before the American Climatological Association, Washington, D. C., May 2, 1900.

The instinct of the Rocky Mountain beaver teaches him to build his winter hut in conformity to his environment, and wonderfully so with regard to the severity or mildness of the approaching season. A shrewd weather prophet interprets these findings and thus prognosticates the future of his fellow men. Who will prognosticate the probabilities of life and death from the character of our own habitations? Are they a healthy outgrowth of man's conformity to his environment? No, it is right here, as I hope to show, that the greatest nonconformity lies. The question of the suitability of man's abode and life to his highest development may, I think, be studied better through the subject of VENTILATION than in any other way.

THE DEGENERATIVE RESULTS OF DEFICIENT VENTILATION.

There was a man in our town who was much annoyed by the constant dinging of a piano in an adjoining apartment of his lodging house. So he rigged up a gong, run by electricity, and his improvised music was made to loudly accompany the piano till the latter stopped. If there could be an automatically acting ventilator invented, built into a window pane or into the outside walls of a room, which would sound a gong whenever ventilation was imperfect—by reason of any excess of carbonic acid or any organic impurity above an established healthy standard—and such device were used in all living rooms, there would be so much noise in every town that nothing else could be heard. The racket would probably bring relief in perfect ventilation and the readjustment of the hearing organs to suit this noisy environment would be accompanied, or rather antedated, by a great decrease in the degeneration which induces tuberculosis. The reward for the successful inventor of such an automatic ventilator should be great, for the good results would be almost inestimable. Of course a visual index of atmospheric purity and impurity might be substituted for a sounding alarm or gong, which, when the desired limitations were reached, could be made to show them.

This would not be a more wonderful discovery than many that have been made of late—as for instance the thermostat or heat regulator, which automatically controls the heat of a building within one degree of a desired point—but what a salutary correction it would be of the defects of our living rooms.

Let us take an average living room, say 14 feet square and 10 feet high. Not wishing to be illiberal I have assumed this as the average size, approximately, of living rooms where one person sleeps at night or lives by day. There is, we will say, an average of one door and two windows to each such room. Of course we can instance such a room wherein half a dozen sleep, and again we may know of a home where one person occupies a room of three or four times that space. It is a fair average we are after. We will say this 2,000 cubic feet space represents about the average of the hundred thousand living rooms there are in a city of that many inhabitants. It should be noted that the total window space is one-half covered with curtain, and as the sun can be shining into only one side of a house at a time, and as half the time he is usually shut out by clouds, how little of the direct sun's rays can get into this average room.

We will further describe this room as having no fire place in it, (the great majority have not), and as having the door shut nine-tenths of the time, and a window not open one-tenth of its area for one-tenth of the time.

This room has been evolved in the progress and is one of the results of our civilization. We may admit its necessity because it is here to stay; but the evolution of its ventilation is as yet an unsolved problem to over 90 per cent. of humanity.

What then should be sufficient ventilation that health may not suffer for the want of it? It is not merely that the carbonic acid which is thrown off from the lungs shall be replaced by its equivalent of oxygen from the outer air. So perfect are the joints the builders make, in this day of advanced art in architecture, that a guest room, though aired and then unused for weeks, may need ventilating again before a new occupant enters; why? because it has lost the natural qualities of the out-door air.

A man exhales 400 volumes of carbonic acid to every 2 to 4 volumes he inhales; he must then have 4,000 cu. ft. of air per hour as Parks says, and 1,800 as Briggs determined, lest the carbonic acid in a room exceed 6-10,000 and 8-10,000 parts respectively, which they separately considered to be the limits beyond which impurity should not be allowed to go. It is estimated that 2 candles give off as much carbonic acid as a man, a lamp as much as two men, and an ordinary gas burner as much as nearly six men; so in addition these sources of impurity must be considered. Ventilation necessitates the recognition of the fact also, based upon the consumption of a pound of coal per hour, that for heating a room, 2,072 feet of air will be required for 14 hours in the day. A thorough knowledge of ventilation necessitates, likewise, an appreciation of the various activities of persons contained in a room; also of the extra equivalent space in a room needed to off-set the rarefaction of the air at great altitudes; also the estimating of various diseased states—as when during fever additional poisons are thrown off into the air, and also the determining of the chemical and organic changes taking place in laboratories and workshops.

Though all these are important there is still something more needed to secure perfect ventilation. That the air change in this size of room is inadequate it is not only my purpose to show, but that there are other faults about this room, even were it twice as large, which seem not to have been generally, if at all, recognized. This I think I can make you appreciate in asking you to consider with me THE LIFE OF THE AIR. We will come to see that there is a vitalizing principle whose force is annulled by the imprisonment of the air through defective ventilation.

How shall we express our conception of this vitalizing principle so that we may recognize its dissolution under absence of ventilation? If we only had some simpler way of giving to the sun his due credit as the source of all the heat, light and motion of life manifested on the earth than has Fiske, who says "The difference between the tropical heat of Indian and the cold of the Arctic regions is simply the measure of untold millions of tiny differences of rates of oscillation of countless atoms of atmospheric gases, determined in turn by innumerable oscillatory movements propagated FROM THE SUN TO THE EARTH." (1)

It is a simple statement, the truth of which I think all will accept, that THE LIFE OF THE AIR EXISTS CHIEFLY IN ITS MOTION, which, with its light, heat and electrical or magnetic power, comes from the sun. If the absence of this life—here denominated as DEAD AIR,—is represented as a perpendicular line, and LIVE AIR is represented as another straight line at right angles thereto, as is the plane of a ceiling to the sides of a room, then the gradations from live air to dead air, under the subtle influences in which we human beings live and die, can be truthfully represented as a curved line which gradually leaves the horizontal line and comes down to the perpendicular. This deficient ventilation curve is not the same but much like Angus Smith's curved line, (1) (see illustration), indicating at stated times the measures of the light of a candle when gradually being extinguished by being confined in a closed space.

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(1) "Outlines of Cosmic Philosophy."

You can fan this receding flame into life, as you can revive a gradually extinguishing human life by opening a window, but let the previous stillness supervene and the perpendicular line of extinguishment is surely reached. It is this important fact of THE PROPORTIONATE AND GRADUAL LOSS OF LIGHT I wish to call attention to, and by it to illustrate the proportionate loss of vitality in a degenerative disease. Both these losses are so gradual in the beginning they are unrecognizable. A similar curve is the line of life of the human being who is dying or to die of tuberculosis. So gradual and imperceptible to his comprehension are its gradations he does not know where he is on the bend of the curve; but he knows quite as much about it as he does about the deficient ventilation curve, represented by the graded line from live to dead air. We none of us appreciate our own individual positions upon this ventilation curve, as to the respective confinements of our bodies in closed spaces and the resultant imprisonment and dwarfing of our respiratory and circulatory systems; and it becomes a pertinent question to each one of us: Shall we be exterminated by these conditions, or will the final extinguishing act be transferred to our children, handicapped as they will be by our present ignorance?

Where, on our imaginary deficient ventilation curve, is the sample room we have herein described? Do I controvert your judgments—you physicians who have so often felt like smashing the scanty windows of the sick or sleeping chamber in order to let in some pure air—by saying that its imperfect ventilation places it in the second fifth divis-

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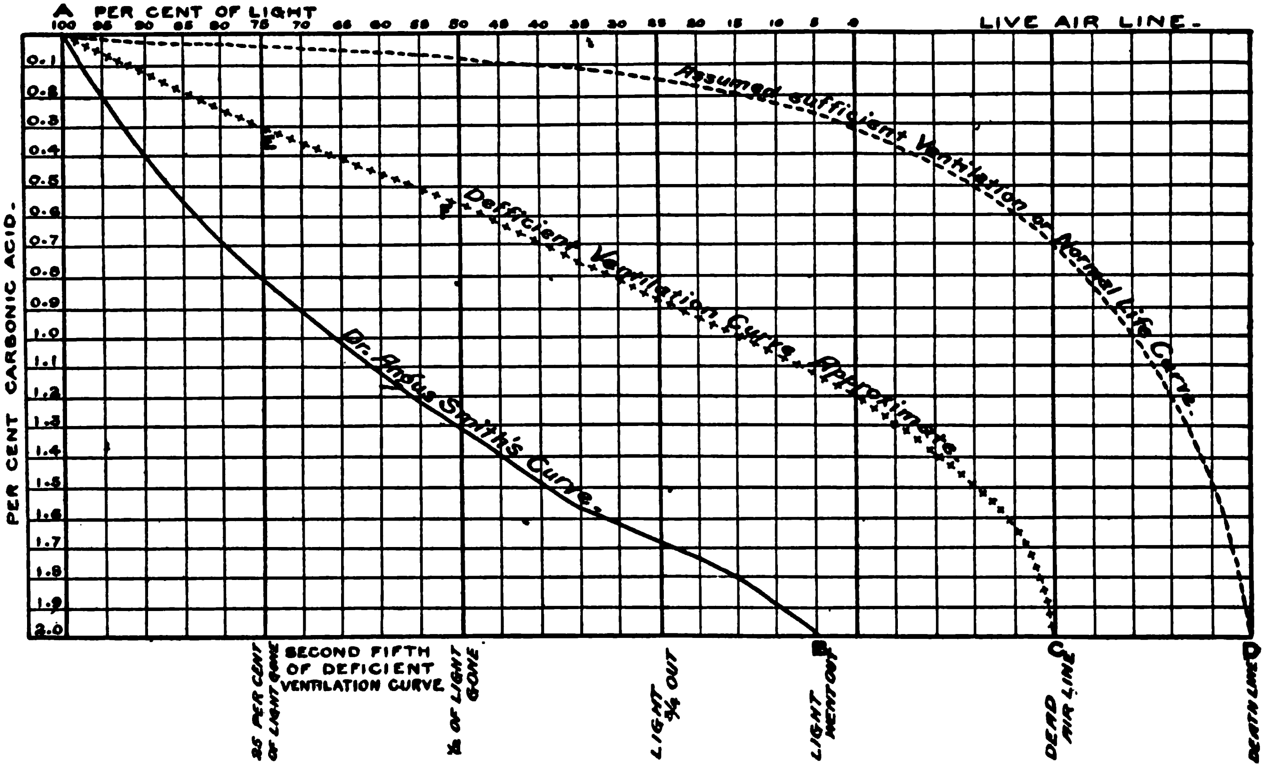
(1) The table explaining this Angus Smith curve gave regular periods of time till the light went out, and the extinguishment was divided into graduations from one-tenth of one per cent. carbonic acid up to 2 per cent. when the light went out. It took eight-tenths per cent. carbonic acid for the first quarter of extinguishment, five-tenths for the second, four-tenths for the third, and three-tenths per cent. additional carbonic acid for the last quarter and total extinguishment.

A B. Dr. Angus Smith's curve, extinguishing candle-light without increasing per cent. GO_2.
A-C. Assumed deficient ventilation curve for comparison with normal life line.
A-D. Approximate normal life line under healthful conditions of ventilation.
E-F. Assumed position on this curve where human beings ordinarily live in houses.



ion, that is, it is 20 to 40 per cent. along on the downward extension of the curve? Admitting this, you see the whole force of my argument. It is by contrast we must judge and our sensations are only partial guides. The purest air and therefore the livest air I know of is found when you stand on some eminence in the rays of the rising sun, with it coming to you from off the hills or mountains beyond, sifted through pines and firs; and with your feet upon the dry but negatively electrified ground, while your head or perhaps your whole body is in the strongly positively electrified atmosphere. You breathe into your uttermost air-cells this ozonized air and your cast off carbonic acid goes from you the instant it is exhaled. Every nerve in your body is stimulated to normal life, and your very soul is lifted up in thankfulness to God for His provision of this feast.

Turn now to a counterpart picture. The deadest air I think I ever breathed was in the natural cave of Kentucky. I found there little twelve by six by eight feet rooms, constructed of stone with one door in each and a 16 inch square window. These had been built for the supposed good climatic effect of the EQUABLE temperature, always 58 degrees Fahr. I was told that they took 16 consumptives down there for one month. Four died down there, and one a week after coming out, and none were benefitted. In comparison with the positive effects of LIVE AIR cited above, such negative conditions, such deadness of atmosphere and ignorance of the requirements of human beings, gives the mind an ineffaceable shock and impels it to dwell upon the machinations of the Devil whose abode, except as to its traditional temperature, this cave typifies! Should a further illustration of DEAD AIR be needed, call to your imagination the lead chamber which Angus Smith constructed for his experiments (1), and in which no possible interchange of air with that outside could occur. Imagine Dr. Angus Smith remaining therein, rebreathing its atmosphere as he did till candles went out, and you will have a good idea of what I mean by absolutely dead air, the effects of which, as described by this faithful investigator, I have not time here to dwell upon. (2)

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(1) Air and rain.

(2) Dr. Angus Smith, (in his "Air and Rain") in describing his sensations when confined in his experimental "lead chamber", containing 170 cu. ft., says of the chemical actions going on in the body, "They may take ten years to gather impetus to make their movements strong enough to produce sensations, and disease may be generated unknown to the individual, although it may kill him in the eleventh year, but if the chemical action began at first

Previous to this experiment Dr. Angus Smith had thought the real evil was from organic substances in the air, but afterward he concluded that carbonic acid, even in small amounts, had an injurious influence. In this connection it is interesting to note that Lavoisier and Seguin found that the human limit of the possible rebreathing of air was when the carbonic acid had reached 10 per cent. and that "was bearable only for a short time," while Angus Smith says "it seems to be impossible to endure four per cent. for any length of time."

The life of the air consists, to a greater extent than has been heretofore recognized, in the molecular motions of its atoms caused by the sun's influence. The diffusibility of the air, the easy motions due to changes of temperature in different strata, and the fact that light as well as sound depend upon the wave motions of ether, are all forms of molecular activity which probably impart the life giving principle to our atmosphere. This motion is always present till meddlesome man interferes. For instance, if a narrow beam of light is thrown into a closed dark room in which the air is apparently still, every particle of dust is seen to be in constant motion. From the fact that there are varying states and amounts of electricity in the different strata of the atmosphere, a conclusion is justified that finer forces govern the life of the atmosphere than merely its composition of oxygen, nitrogen, moisture and carbonic acid. Besides, let us not forget the contribution of vitality vegetation brings through its constant interchange of oxygen for carbonic acid. This with the qualities of atmospheric electricity and molecular motion, are all IN RESTRAINT if not wholly annihilated in our supposed poorly ventilated room.

This restraint of molecular motion and therefore limitation of vitality are in direct proportion to the deficiency of ventilation. Herein I conceive lies the great mistake of our civilization in relation to healthful human life. Here is to be seen the need of education that this cause of disease may be understood.

Let us try to elicit analagous evidence of vitality in the growing media of other products of nature than that of the dwellers above the surface of the earth. The ground in our latitude becomes regularly DEAD EARTH

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so violently as to produce decided sensations, he might be able to avoid it at once before it produced any abiding impression." After remaining in his chamber 100 minutes he found a reduction of oxygen to 20 per cent. and "the air had an unpleasant flavor or smell" and on entering it again after a minute he found it "extremely bad." He says "it took about four hours for the lungs to recover their tone."

to vegetable growth as the cold of the fall and winter gradually annuls its vitality; but the warm penetrating rays of the sun in spring and summer as regularly again transform it into LIVE EARTH for the wonderful fructification of plant and animal growth. Plants, too, have their life-curve which depends upon the vivifying and transmitted influence of the sun's rays. Shut out that influence and that life-curve becomes immediately abbreviated.

Again, let us consider the fish class, a medium creation depending upon air and water for its atmosphere and food. They constitute it's life giving agency and cannot be greatly changed without its extinction. How wonderful is the effect of the fish's environment upon its life-curve, and upon its distinguishing characteristics, as shown by the eyeless inhabitants of dark caves, the big-eyed sun fish of the open pond, the sluggish sucker of the mud creek and the lively grayling of the rapids.

The livest water I have ever seen was when, within view of a snowbank in the Rocky Mountains, a cold dashing mountain stream lashed itself, by its perpetual motion over rocks and stones, into a fit abode for that king of fishes the mountain trout, that creature full of ozone and vim, which life elements he transmits even to the fishermen who joyously capture him.

Note the difference in the life quality of that trout and of another one of the same species pulled sluggishly up from 100 feet below the surface of a still lake. The higher the order of evolution, i. e., the more delicate and special the development of the nervous structure, the more susceptible to and influenced by the changes in environment are all created beings.

Applying this principle to the human family, we see that a limit of civilization can be reached where delicate or small changes of environment may dissolute as well as evolute; where EXTINCTION even from LACK of conformity may take the place of EVOLUTION BECAUSE of conformity to our environment.

There are two sides to every question. We may argue against the cramped chest and round shoulders of the bicycle rider; but the bicycle is doing a world of good in getting people out of doors, in addition to the improved aeration of the blood which results from its use.

We admit the "visiting the iniquities of the fathers upon the children unto the third and fourth generation," meaning in these days syphilis and like hereditary evils; but this law of transmission likewise works itself out to the extinction of the users of defective and deficient ventilation.

We discuss the inhalation of irritant powders and poisonous gases occurring in certain hazardous occupations; but defective ventilaton, considered in conjunction WITH such causes of disease, increases their injurious effects many fold.

We may reason, as with few exceptions everybody does, that the bacillus of tubercle, being the constant accompaniment of the decaying process in tuberculosis, is consequently the CAUSE and source of all this evil;but the very lateness of its appearance shows it to be rather A RESULT than the cause. Its absence in so many forms of scrofula, adenoid growths, wastings and catarrhs surely eventuating in mature tuberculosis, show that the pre-tubercular and perhaps the first stage of tuberculosis is already established presumably in advance of the germ. These conditions are proved by the tuberculin test to be a part of the real disease before the microscope or any other occular demonstration of the bacillus is possible. The Widal test for typhoid fever now joins the tuberculin test in showing a dyscrasia to exist which we know is the presence of latent tuberculosis. This occurs before any ocular evidence is possible of the nature of the germ. The destructive influence of sunlight upon the bacillus of tubercle is now generally admitted (1) If, in addition, the contention of Fraenkel (2) that it is a FACULTATIVE ANAEROBIC GERM is sustained, then the claim of a predisposing cause in defective ventilation is strengthened by the favorable conditions furnished for such germination in the unventilated lung.

We thus go back of the tubercle bacillus germ to conditions which are bound under favoring circumstances to eventuate in it, and the following important statement is warranted, which controverts the trend of scientific thought of this decade as to the prevention of tuberculosis; namely: If all of Koch's bacilli of tubercle on this earth were instantly destroyed, in due time, THE SAME CONDITIONS REMAINING, our world would again have an ample supply. It is not for me to pretend to know the exact time which would elapse, under such a supposed temporary dispensation of Providence, until the terrible intensity of the "white plague" would be again as great as at the present time. The OLD TIMES would come back again soon enough! Undoubtedly we would some of us, even those who are now incubating the germs, live longer and be much wiser for such an experience. We would, however, surely see the wave of bacillary domination sweep back over the human race, bringing the equivalent of the present time, when as Osler says, two per cent. of the people living have the disease, and, when, as it seems to me, ten times as many are getting ready for it.

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(1) Koch. International Medical Congress, Berlin, 1890.

(2) Sternberg's Manual of Bacteriology.

Let us not mistake the providence of God. Tuberculosis has come here to stay until we, the thinking masters of creation, acquire the education to understand and abolish it. It will not "down" in response to any edict against street expectoration, the disinfection of rooms occupied by dying consumptives, or even the slaughtering of tuberculous cows, however important these measures of prevention most assuredly are.

Now the drift of this reasoning is to this conclusion: That tuberculosis springs from or is the outgrowth of some UNIFIED CAUSE which will account for its existence in cattle and horses, birds and animals, as well as in man.

I wish to refer to the excellent paper (1) presented by Dr. Charles Gresswell to the National Live Stock Association at their late meeting in Fort Worth, Texas. From his considerable experience as a veterinarian in Colorado he shows that it is entirely unnecessary to use the tuberculin test with the "plains" cattle in the Rocky Mountain region, because even those previously infected, and transferred to the plains, THERE outlive their tuberculosis, and it does not appear in the next generation. In proof he instances the surviving members and the progency of a very badly infected herd of over-bred Shorthorns, inbred and closely housed, of which I myself was cognizant.

If also you bear in mind the great mortality from phthisis, etc., of the French and English cavalry horses under close stabling, which was quickly prevented by open air stabling. (2)

If also you are acquainted with the corroborative evidence of the close domiciling of cows, the confined caging of birds, monkeys, guinea pigs and other animals, the crowding (3) of human beings in ship-holds, prisons (1) alms-houses, (2) and places of public detention, or the civilizing and housing of savages, as of the American Indian, you then have to come to the conclusion: That either tuberculosis results from I. a species of auto-infection from breathing the body's own exhalations, or II. from the fact that the air of these confined spaces becomes a source of infection from the loss or annullment of its life giving principle.

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(1) "The Elimination of Tuberculosis Out in the Open" by the author, Journal A. M. A., Feb. 3, 1900.

(2) Parkes (Practical Hygiene) refers to the experience with horses in the French cavalry service and says that in ten years a loss of 190 in the thousand per year was reduced to 68 by giving them more room in their stables, while in English cavalry service the change for the better by similar treatment was even more striking till the annual mortality was reduced to twenty per thousand.

(3) Parkes (Practical Hygiene) in noting the relation of increased mortality to density of population adds that "its main concomitant condition is impurity of air from overcrowding" * * * "especially among children whose delicate frames always give us the best test of the effect both of food and air."

Thus we are brought back to our sample room, the abode of a human being, the meagre size of which, and its deficient sunlight and air circulation, afford a sufficiently marked degree of deficient ventilation to constitute it a glaring fault of our civilization. This now seems to be the initial cause or starting point of tuberculosis, which probably kills more people than does war together with any other one form of disease known.

The study of the remarkable diffusibility and penetrability of gases, even through glass windows and brick walls, not to mention wooden doors with the many cracks around them, gives us some hope through what is called "insensible ventilation." (3)

But the fear is that even this much of protection will be annihilated through the PERFECTION (?) of carpentry. The education which the people need, even the common people, and we doctors too,

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(1) Dr. de Chaumont's analysis (Parkes Practical Hygiene) of the air in eleven barracks and hospitals showed an average excess of over six volumes carbonic acid per 10,000 and nearly twice that in the cells of four different prisons. Other and extreme analysis given of air in rooms, (in orphanage dormitories and detention places) with space per head all the way from 51 to 150 cu. ft. gave from 31 to even 72 volumes of carbonic acid to 10,000. The ratios were constantly greater the more confined were persons or animals.

(2) Carmichael found in the Dublin House of Industry (crowded with children) that "the only cause for the excessive phthisis were the foul air and want of exercise."

Parkes says "the only circumstance which is common to the two classes (speaking of seamen and civilians working in confined close rooms and thus causing phthisis and lung disease) is the impure atmosphere."

Is not the subtle occurrence of hospital gangrene in closed wards, and its infrequency in tents, an indication that the closeness is to blame?

(3) In illustration, take notice of the dark lines on the plastered ceiling of a much used and neglected room. They are the inter-spaces between the laths where the dirty air has been sifted through.

MUST be obtained, and the architects and builders are not exempt from this necessity. (2)

A more thorough study of this intricate question would lead the architect, whose usefulness is too much limited by the demands of an ignorant public, to be an upbuilder of people's health as well as of their houses. It is to be hoped he will thus arrive at a more encouraging conclusion than did James A. Greenlief, C. E., in his "How Much Ventilation?" when he said, "For ordinary private houses a systematic air allowance per individual is almost an absurdity—for many of them a thorough systematic plan of ventilation is unnecessary, even were it not debarred by reason of the expense inseparable from it."

Whether ventilation, suited to the size and purpose of a building, the climate and the exposure, shall be by NATURAL or ARTIFICIAL means, whether by PROPULSION or EXTRACTION, and how modified by the great variety of artificial aids of heat, steam power and electricity, we have not here time to consider in detail. My object now is to emphasize the NEED of ventilation of our living and working rooms. The lack of it leads to the pale face, sallow skin, weak pulse with cold hands and feet and with sluggish bowels; the feeble powers of digestion, assimilation and nerve energy; all proofs of a flagging vitality. This lethargy is due to the enfeebled and poisoned blood corpuscles, and a probably auto-infection, but worse than all to the deprivation of food for the blood, i. e., oxygen from the air. In addition the DEAD AIR, which marked deficiency of ventilation implies, compels in the lungs that inactivity and limited use, which in turn means the gradual clogging of out-of-the-way air-cells with the products of combustion. There, and thus in the lungs, carbonic acid poisoning and the species of auto-infection, heretofore described, are most naturally located and more or less permanently established.

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(2) That this education needed must be mainly directed to the ventilation of closed habitations is beyond any doubt; for Angus Smith's calculations (Air and Rain) made in the cities of London, Manchester and Glasgow showed so small a difference in the per cent. of oxygen, as well as of carbonic acid *in the open places* that we can conclude that it is not so much the size of the city or the number of rooms in it as it is the character of the rooms themselves. Parkes says "the colliers of Durham and Northumberland, where the mines are well ventilated, do not appear to suffer from an excess of lung disease, or do so in a slight degree." While as to 'Metal Miners' he says among them there comes to be, in advanced life, for the males of ages from 45 to 75 five times as many deaths from pulmonary disease "as for males exclusive of miners in Yorkshire." This latter evidence bears upon the quality of the dust in crowded places and rooms. It is organic to no small degree. Tichbone (Parke's Practical Hygiene) in a Dublin street found it from 30 to 45 per cent. organic, and Chalvet, in a hospital ward in Paris, found the dust to be 36 to 46 per cent. organic matter. The sickening headache which some sensitive persons experience in, or after attending a crowded theatre, is probably not wholly due to the breathing of excessive carbonic acid. This "crowd poison," as this air of crowded halls is sometimes called, undoubtedly contains much organic matter thrown off in the exhalations of the people there assembled. Even the moisture of these exhalations is no inconsiderable a matter. Parkes averages an estimate of 211 cubic feet of air needed to maintain, in a state of vapor, the 25 to 48 ounces of water which a human being gives off in 24 hours' time, and he adds that when carbonic acid in the air has reached 7-10,000 the smell of organic matter is generally perceptible, and it is "very strong" when 10-10,000 is reached.

I will not pretend to say what the detail of a law of ventilation will be, but there should be such a law and that too enforced by proper legislation. That detail will be an outgrowth of the education which is essential to right legislation. In general, however, it should limit the minimum ventilation allowable in every assemblying place or habitation for human beings, and for dairy cows, horses, etc. That limitation should be adjusted to the various lives and their activities with which the law has to do. If law can protect life, as it aims to do, by fire escapes, the necessity of stand-pipes, the abatement of the smoke nuisance, the ventilation of sewers, and the non-pollution of drinking water; why should not this subtler and ever present cause of degeneration and death, DEFICIENT VENTILATION, even in its slighter degrees, come under its fostering care? Certainly it should. I suggest that the effort should be made to establish and maintain the equivalent of the following: To wit, for a living apartment a minimum space of 1500 cubic feet per individual, and a minimum ventilation or change of air of 2000 feet per hour per person. If this much is not otherwise afforded in all new houses, then transoms over outside doors and windows, preferably opening inward at their tops, should be required. (1)

A course for the study of ventilation should be made a prominent feature in all advanced schools and colleges, and the government should carry out the many investigations which will help to determine both the best means and the proper and necessary limits of ventilation. This is one of the ways in which a NATIONAL BUREAU OR BOARD OF HEALTH, properly established and supported by our general government, could prove itself one of the most useful and worthy of all the different departments which are represented by secretaries in the President's cabinet. Until such a National Board is established the government ought to found and liberally maintain a Commission on Ventilation of Houses, Public Halls, Schools, Factories and Mines. Properly conducted, such a commission could do a world of good.

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(1) The variation of a proper law may be needed to suit the assembling of arge bodies of people in halls, churches, etc., where occupancy is limited to a short time and a less space per capita seems to be allowable, or again where additional air is required as in hospitals and certain work rooms. But the building inspector, properly working with or under the Board of Health, should not only be possessed with a spirit of the law's righteousness, but he should be a man of high intelligence and force.

In the discussion of this paper Dr. Phillips, of Washington, called attention to the experiments of Dr. B. W. Richardson, (Preventive Medicine—Lea Brothers), which served to confirm this contention for the LIFE OF THE AIR.

Richardson confined under glass, so they could be watched, four warm blooded animals, a cat, dog, rabbit and a pigeon, also two frogs, and gave them forty gallons of pure oxygen. He proved that the passing of the electric spark through the once used oxygen (which had killed or was killing the warm blooded animals, although only one-eighth of the oxygen had been consumed or was lost), restored its lost life or vivifying power.

To quote Dr. Richardson: "Oxygen, when breathed over and over again, although freed entirely from carbonic acid and other known products of respiration, loses its power of supporting life: the process of life ceasing, not from the introduction of poison, but as by a negation or a withdrawal of some principle extant in the primitive oxygen which is essential to life." (1)

Whatever explanation we give for this, whether that there is a possible rearrangement of the molecules of oxygen due to respiration which makes it afterward unsuitable to respiration; or, as Dr. Phillips suggests, that our accepted molecular divisions of matter are possibly not ultimate, we are entitled I think to assume this experiment to be the strongest possible proof of the main argument of this paper, i. e., that the chief vitalizing principle of the atmosphere is annulled by deficient ventilation.

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(1) See also "Composition of Expired Air and its Effects upon Animal Life." Smithsonian Contributions to Knowledge, by Billings, Wier Mitchell and Bergey.

THE CREOSOTE TREATMENT AND THE USE OF DRUGS IN TUBERCULOSIS. (*)

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Mr. President and Members of the Cincinnati Academy:—

As the first and pleasant duty I have to thank you for the courtesy and compliment of an invitation to address you tonight. I love this old Queen City; her men, her history, her institutions. Therefore may I not rather say: for the pleasure of meeting former friends, of making new and renewing old friendships in this my former medical home, I thank you.

Tuberculosis, like the poor, we have always with us; and we can today but echo the words of Hippocrates, written more than two thousand years ago, "The greatest and most dangerous disease, and the one that proved fatal to the greatest number, was consumption." (1)

Whatever the character of our professional work, whether in medicine or surgery or in any of the special lines to which men devote their chief energies, we have all to confront this disease, all have to battle with it. And a matter which concerns and engages the constant interest of all physicians in all places, seems an appropriate subject for discussion by a professional body like this. Indeed, conditions may arise under which it may seem almost a duty for such a body to express its views and convictions.

When a particular method of treatment of a common and serious disease comes, by general consent, to be the prevailing and almost routine treatment pursued by the average doctor; when this average doctor, having made the diagnosis, usually proceeds to put the patient upon this treatment, a condition has arisen under which it becomes our duty to try to reach clear, definite and reasonable convictions upon the origin, rationale, propriety, efficiency and most efficient conduct of such a practice.

The more is this true when extremes of opinion meet and the resulting discord falls upon the ears of this average practitioner. For when doctors disagree, who but you, good doctors, shall decide?

(*) Read by invitation at the Cincinnati Academy of Medicine, Nov. 27, 1899.

(1) Quoted by Knopf.

From time immemorial the profession has recognized, and does today recognize, that the most efficient means towards the prevention and cure of tuberculosis are not found among drugs. Yet we have always used, and do still universally and constantly use drugs in the treatment of this disease.

I am therefore led, in beginning this paper, to make some brief introductory remarks, of an apologetic character, upon the real attitude of the profession toward drug therapeutics. We are often criticised, and in a measure justly, for an apparently excessive attention to and use of drugs in the treatment of the sick. It is often charged that in our medical colleges the teaching of therapeutics means simply teaching the action and uses of drugs. Farther than this, and of more far reaching significance, the practice of medicine, the professional care of the sick, is, in popular conception and expression, made synonymous with the administration of medicines. A physician is one who treats sick people by giving them medicines, drugs. Therefore, by logical inference, one who treats the sick by other means is not, in the ordinary sense, a physician, nor is he subject to the laws, the social obligations and moral responsibilities under which the medical profession acts. So far has this narrow and debasing conception of the practice of medicine been carried, that an Indiana judge, himself a professional man and presumably an intelligent and thinking man, is said to have recently adopted this view in deciding a contention between the State Board of Medical Registration and a representative of one of the passing outbreaks of charlatanism.

Is it true that the intelligent medical profession, as a general principle and guide of conduct, looks upon drugs as the sole or even the chief reliance for the help of the seriously sick? Certainly it is not. A discriminating reading of a series of standard text-books, covering centuries of medical teaching and practice, will sufficiently correct such a mistaken view. An opportunity of following and coming into close touch with the daily thought and action of any reputable physician will surely lead to a different, a broader and a more true conception of the practice of the healing art.

In response to such criticism, therefore, it seems to me that two things may be said, and should be kept in mind if one should judge us aright.

We do not look upon the practice of medicine as synonymous with the giving of drugs. The whole history of medical thought and action, as exemplified by its representatives and leaders, and the pages of every recognized text-book, are against such a view. We hold that our work is to help the sick, by any and every means available, and that, whatever part drugs may play in this work, it is only a part; important or insignificant, major or minor. necessary or indifferent, but only a part. To this larger, deeper conception, we have and do and shall hold.

But we do universally and almost uniformly use drugs; and for this there are reasons. The other therapeutic means are not always and everywhere available. The patient may not be able or willing to rest, to change his vocation, to change his residence, to have the most suitable diet, the most efficient nursing. Or he may be and usually is able to have only some of these things, or to have them imperfectly applied. But medicines are always at hand, always available; may be given regularly, easily, cheaply, in definite quantities; may be easily varied in kind or dose to suit the varying needs. In a word, however uncertain the other means, this one is always available. We know that we can give the patient medicine, though we may not be able to give him the benefit of all or most of the other things which might help him. Knowing this, and realizing its practical significance, we make special study of this class of agents, and take special pains to be prepared to apply them to best effect. Moreover, knowing their availability, under the varying and uncertain and limiting conditions under which we work, we do constantly labor to extend their range and effectiveness, in order that we may with more confidence, as in our every day work we feel the need, rely upon them.

Yet we do not deliberately and on principle reject or neglect other therapeutic agents. On the contrary, we constantly keep in mind, and teach and enjoin their use as often of equal, often of greater value. And when charged with the sin of an exaggerated estimate and an excessive use of drugs, we reply that, being human, and being under constant temptation by reason of the hampering conditions of our daily work, we may err as do other men. But we also reply that our critics often misjudge us, taking but a superficial view of our conduct. They see and think chiefly of the medicine case, which we indeed perhaps too often thrust into the foreground; they forget the mind skilled in healing and the hand trained to extend any and every available help.

And with these thoughts I return to the opening words of this paper; that from time immemorial the profession has recognized, and does to-day recognize, that the most efficient means toward the prevention and cure of tuberculosis are not found among drugs; yet we have always used and do still universally and constantly use drugs in the treatment of this disease. Our patients suffering from tuberculosis cannot, as we know by daily experience, always nor usually have, in full or even in fair measure the benefit of all or of any of the means which we still recognize as the most valuable when ideally applied. We do and must do for them the best that we can under the circumstances; and therefore here, as elsewhere, we try drugs. We find these drugs valuable. We search out and try those which seem the most valuable. Failing to secure satisfactory results, we try others. Encouraged by the statements of those to whom we look for progress and guidance, by plausible logic, by suggestive experiments, or by partial and hopeful results; led by force of habit or by the need and advantage of uniformity, we from time to time settle by general consent upon this or that drug as the one upon which we, for the time at least, fasten our hopes and our reliance. Now it is cod liver oil, then hypophosphites, and today by common consent it is creosote. In his Autobiography of a Quack, a revision of a story written many years ago for the Atlantic Monthly, Weir Mitchell makes the Quack, a patient in a hospital, say: "The patient next to me has consumption; he smells of cod liver oil and coughs all night." Surely if the eminent writer should issue a third edition of his story, he would have the Quack to say: "The patient next to me has consumption; he smells of creosote and his cough is somewhat better."

The consensus of medical opinion and practice today is that, among drugs, the chief place is given to this remedy. It seems appropriate therefore that we should devote an evening to the consideration of the creosote treatment of tuberculosis; its origin, rationale, practical application and results. I hope we may thus come to a clearer view of its real position and value.

A great movement is under way in the study not only of the pathology and prevention of tuberculosis, but of its treatment. Men are, in increasing numbers and with increasing diligence, devoting themselves to this work. What do they and what do we think of the agent which today occupies the foremost place in the mind of the general profession?

In his Practice of Medicine, Osler says of creosote: "It is an old remedy strongly recommended by Addison." It's modern revival and prominence are due perhaps chiefly to the publications of Jaccond, Bouchard, Fraentzel and Sommerbrodt. I am inclined to think that Sommerbrodt has had as much influence as any one in popularizing the use of creosote, because he taught in an emphatic and definite way the administration of this rather distasteful remedy in capsules. The profession and the public was about ready for a change, partly for the sake of a change, partly in the hope of something better. Cod liver oil had failed to sustain its reputation for specific virtues and had become literally distasteful to both doctor and patient.

The hypophosphites were proving similar failures, and were coming to be looked upon, as what they really are, second-rate tonics. Through the unfortunate professional perversion of the day, neglected in their best form as presented in the Pharmacopoea, they are rapidly degenerating to dependence upon the advertising pages of the medical and popular press. The bacterial pathology was rapidly coming into influence, and the profession was looking for something which would not only bring about improvement in the general condition of the patient, but which, there might be reason to believe, attacked the cause of the disease, the germs. Under these conditions the creosote treatment came rapidly into prominence and became popular. For it was and is, in many cases, followed by marked improvement; and being a drug whose antiseptic and germicidal properties could be demonstrated, and which could be freely administered without apparent harm, it seemed as though, with its advent, we were in the presence of a long sought specific remedy. Did it not improve the appetite and digestion and nutrition? Was it not a proven germicide? Was it not recognizably excreted through the lungs? How hopeful, and rationally hopeful it all seemed. Certainly it is not surprising that creosote came into common use and high repute. And who shall say that this repute was undeserved? For we were trying to do the best we could for our patients, and this seemed to be and perhaps is the best of known drugs.

Pharmacologically creosote belongs to the aromatic series of the carbon compounds, of which carbolic acid is the most conspicuous member. In a general way the antiseptic and antipyretic properties are the most marked qualities of the group to which creosote belongs. They are all more or less poisonous; though in this respect they differ widely. All, when applied in concentrated form, are irritants; some are violent caustics. They are for the most part excreted through the kidneys. Most pharmacologists speak of creosote and carbolic acid as closely allied in physiological action, and describe them together, though the latter is commonly stated to be and is popularly considered much more the poisonous. Clinical investigations have of late tended to reveal less of a difference in this respect between these two drugs, it having apparently been shown that carbolic acid given highly diluted is less dangerous to life than is commonly supposed. The dose of creosote is usually given as from one to three or five drops.

Brunton speaks of creosote as follows: "It destroys low vegetable organisms and prevents the fermentation which they cause. When administered to small animals it causes great dyspnoea, weakening of the heart's action, paralysis, and often sudden death. Its action differs from that of carbolic acid in the absence of convulsions and increased coagulability of the blood."

Cushny says of it: "It may be regarded as a wood tar from which the more poisonous phenols and less volatile bodies have been eliminated, leaving guaiacol and cresols as the chief constituents. Its action is similar to that of carbolic acid, except that it has less tendency to induce nervous symptoms, and is less irritant and poisonous. On the other hand, it seems at least as strongly antiseptic as carbolic acid, and, according to some investigations, far excels it as a germicide." Cushny further says: "It is generally supposed by the advocates of the creosote treatment that the remedy destroys the tubercle bacillus in the lungs through its antiseptic properties. On the other hand, animals infected with tubercle and treated with creosote die as soon as controls which are untreated, and the sputum of phthisical patients treated with creosote is as virulent as that of others not so treated. Besides, the administration of creosote by other ways than by the mouth is said to be very much less efficacious. Another explanation of the creosote action is that it acts as an intestinal antiseptic and prevents the secondary infection of the bowels. But it has been objected to this that the other intestinal antiseptics are of little value in tuberculosis."

As already stated, the dose of creosote, as given in most of the books upon materia medica and therapeutics, is small, being based upon its use some years ago chiefly as a stomachic, anti-emetic and gastrointestinal antiseptic. Doubtless also it was influenced by fear of its poisonous properties. Even since it has come into vogue as a remedy for tuberculosis and been given in large doses, there remains much difference of opinion as to the proper amount to secure the best results. This disagreement is evidently due to difference in the therapeutic principle upon which it is used. Those who believe it to have direct germicidal action upon the bacilli in the tubercular lesions, or the power of preventing the growth of the bacilli in the healthy tissues surrounding these lesions, are advocates of the larger doses. Those who look upon creosote as valuable chiefly for promoting appetite and digestion and general nutrition, consider small or moderate doses all sufficient.

In my earlier experience with creosote I was inclined to follow the principle of giving the largest possible doses in all cases, trying, as the common expression is, to saturate the patient with the drug. The results in some cases certainly seemed to point toward this principle as the correct one. Yet I confess to have been gradually led by experience, by the study of many cases of different types, the treatment extending and being watched over long periods of time, to modify this practice. And this change of practice is due to modification of my view of the relative importance of the therapeutic actions of the drug.

While I am not ready to surrender all conviction, perhaps I should say all suspicion, of the anti-bacterial action of creosote upon the tubercle bacilli in the tissues, I no longer look upon it as chiefly beneficial in that way, nor to be administered as a routine practice on that theory or expectation. As a result, my dosage has on the whole diminished. While in some cases I gave what are ordinarily considered large doses, from twenty to forty drops, or give such amounts for a short time, I do not think that today my dosage of creosote will average more than half that of several years ago.

The method of administering creosote is of some importance, especially when considerable doses are to be given for a long time. The drug is to most persons disagreeable, particularly at first, and every effort should be made to avoid disgusting the patient at the start. Creosote has, until recently, usually been given in solution or mixture with various menstrua, chiefly cod liver oil, wine or milk.

The mixture with cod liver oil in bulk has seemed to me especially undesirable and I have long since abandoned it. Even when thus given in capsules, I have thought it especially liable to disagree with the stomach and to be followed by disagreeable eructations. This mixture has seemed to have a peculiarly unpleasant and even offensive odor, and to leave such an offensive odor about the person of the patient. Similarly both I ,and according to my observation my patients, dislike the administration of creosote in wine or milk.

To my mind, however, the chief objection against its administration in bulk with such substances as cod liver oil emulsions, malt preparations, hypophosphites, wine or milk, is not simply of the disagreeable taste and odor of the drug in this form, but because it often turns the patient against these things which are so useful and even so necessary to his welfare. Particularly is this true of milk, such an almost indispensable article of diet for the sick. We could rather give up creosote than give up milk in the treatment of tuberculous persons, and therefore with the unpleasant experience I have had with this method, I especially avoid it. Creosote is, I believe, usually best given in capsules, to be filled by the patient or his attendant at the time it is taken. If certain simple precautions are followed there will seldom be serious trouble with or objection to this method. Strict cleanliness of the bottle and the medicine dropper should be enjoined, so that the outside of the capsules after handling may be free from creosote. A little milk taken just before the capsules will make it easier to swallow them, and will in a large measure prevent the disagreeable burning sensation, should any of the medicine come in contact with the mucous membrane of the mouth or oesophagus. It should always be given highly diluted, or when food is present in the stomach to dilute it. I often direct the patient to sit down and slowly drink a glass or two of milk while taking the capsules. Thus is secured the double advantage of dilution of the drug, and the extra nutriment.

As to the other methods of administering creosote, I have not much to say. Upon any theory of its therapeutic action I cannot see that they have any special value over the ordinary plan. The disagreeable odor is sufficient to exclude the inunction method in chronic cases. Administration by enema is a nuisance to the patient; few will continue it for any length of time, and it has no special advantage. The inhalation treatment in general, and the inhalation of this drug in particular, I do not care now to discuss, except to say that I do not think that the inhalation of creosote has any great advantages over a number of other deodorants and disinfectants, of any of which but small quantities can be introduced by this method. Injection into the trachea has been sufficiently tried to show that the beneficial effects are chiefly upon the bronchial tubes, allaying cough, deodorizing and to some extent disinfecting the expectoration. The recent report of Dr. Lysle of Cincinnati indicates the correctness of this view.

Concerning the manner in which creosote acts beneficially there has been much experiment, much dispute, and much, though I believe diminishing, difference of opinion. The claims for it have been based chiefly upon these beliefs; that it acts as a germicide upon the tubercle bacilli or tends to retard the growth in the tissues; that being excreted in small measure through the intact portions of the lungs, it modifies the bronchitis; that it neutralizes the toxins in the blood; that it acts as a general tonic and stimulant to the tissue cells, and finally, that its action is chiefly local upon the alimentary tracts, promoting appetite, digestion and absorption of food and preventing abnormal gastro-intestinal fermentation and putrification, with the result of increasing the nutrition of the patient.

It is almost useless and out of place in a practical paper to discuss at length some of these theories, because it is impossible, in the present state of knowledge, to reach definite and reliable conclusions. Of the germicide theory this much may be said; that animals inoculated with tuberculosis and then treated with creosote are not in any marked degree benefitted; that such strength of creosote as might be present in the tissues could not, according to laboratory experiments, have a destructive effect upon the tubercle bacilli; and finally that the bacilli extruded from or obtained post-mortem from the lungs of persons who have been long under the creosote treatment, have not recognizably diminished in virulence.

While this fact at once deprives creosote of its reputation as an agent for the direct destruction of the cause of the disease, it still leaves some plausible ground for the anti-bacterial theory. For, solutions of antiseptics far too weak to destroy bacteria may prevent, and still weaker solutions may retard their growth. Calculations therefore of the possible amounts of creosote in the tissues, based upon the doses given by the mouth or otherwise, and the resulting demonstration of the impossibility of germicidal action in the tissues, may be misleading.

It is theoretically supposable that a sufficient amount of the drug may reach the tissues surrounding the non-vascular tubercular lesions to retard the growth of the bacilli into those healthy tissues, and thus to retard the growth of the disease. If we could find a reliable agent which would accomplish only this, we should have made a distinct advance in the treatment of tuberculosis. For, with abundance of pure air, high nutrition, and the tonic of a hopeful mind, the addition of such distinct retardation of the advancing infection would often turn the scale in favor of the patient. Would that it were more often and more demonstrably true!

Whether creosote neutralizes the tubercular and other toxins in the blood, I have no opinion to express; because I know of no satisfactory experiments to settle the question. Yet there are plausible theories to support this view. Thus Hoelscher asserts that "It favors the elimination of the poisonous products of tissue metamorphosis which cause the disease symptoms, fever, anorexia, night-sweats, etc. These poisonous products are called labile albumins on account of their marked capabilities of chemical reaction. Hence they unite in the first place with the absorbed creosote, losing their sulphur; whilst the less actively reactive normal albumins only combine later. The withdrawal of the sulphur causes further decomposition, and the elimination of the products of such decomposition through the kidneys then follows."

That creosote has some beneficial effect upon the bronchitis is probably true, as is shown when it is given in other forms of bronchial disorder.

In the presence of increased consumption and digestion of food which follow its administration, it is impossible to say whether it acts as a general tissue tonic and stimulant or not. It seems almost useless to speculate about this point.

Yet here again speculative considerations may be and have been appealed to. "There is some evidence that very dilute solutions of carbolic acid tend to increase the activity of protoplasm. Thus Biernacki and Schulz have found that while solutions of phenol, such as are used as surgical antiseptics, are immediately fatal to the yeast plant, very dilute solutions increase its activity." (Cushny.) It may be that small quantities of creosote, reaching the blood and the tissue cells, may act as a tonic and stimulant to cellular nutrition, and thus strengthen these cells to resist the infection. We do not know and cannot prove.

Now all of this, as applied to the creosote treatment, is so far as we know, largely theory. But much of the explanation of the therapeutic action of drugs is, in the last analysis, theory. It is not chemical demonstration, not even physiological demonstration; it is as yet biclogical mystery. And, therefore, when eminent clinicians and pharmacological philosophers, like Jaccond, Bouchard, Leyden, Fraentzel and others, nearer home, base their practice in considerable measure upon such theories, we must not too hastily condemn the multitude who eagerly and hopefully follow them.

This however may, upon the simple basis of daily clinical experience, be said: that the judicious administration of creosote is frequently followed by increased appetite and digestion, by increase and improvement of gastro-intestinal action. With this comes improved nutrition, increase of strength, increased resisting power, retardation of the local disease and, usually, diminution of the secondary symptoms and lesions resulting therefrom. The patient is better, not chiefly because the medicine has directly destroyed or weakened the germs, but because his tissues have by increased nutrition been strengthened against their enemy. With this end chiefly in view and as a constant guide, should creosote be administered or withheld, the dose increased or diminished? This result will sometimes be secured by small, sometimes only by large doses. If the drug is followed by improvement of appetite, it may safely and beneficially be given. If not, or it produces persistent gastro-intestinal disturbance, no amount of it forced upon or by any channel into the patient will do him much good. With this rule, I feel sure, all who have carefully studied clinically the creosote treatment of tuberculosis, will agree. In the language of Virchow, speaking of the diphtheria antitoxin, theories must give way to the force of clinical facts.

A number of substitutes for simple creosote have been devised and earnestly advocated, the most conspicuous being guaiacol, carbonate of guaiacol and carbonate of creosote. The chief advantages urged for them are less unpleasant odor and taste and less gastro-intestinal irritation. Of guaiacol I must say that my experience has not borne out either of these claims for it, and being much more expensive than creosote, I have ceased to use it except as an occasional external application. The carbonate of guaiacol is almost tasteless, and is said to pass through the stomach into the intestine, there to set free its guaiacol. These properties make it seem very promising, especially when given upon the theory that the guaiacol is chiefly valuable when absorbed from the intestine and carried through the lungs to attack the tubercle bacilli. But this latter is, as already indicated, but theory and questionable theory at that. Practically, my experience after a considerable use of carbonate of guaiacol is, that it is not without irritant properties; that it often fails to promote appetite and digestion to the same degree as creosote, and that not only is it not more beneficial, but on the contrary is distinctly less so. Moreover, it is also far more expensive. For the same reasons I have come to look upon the carbonate of creosote, the so called creosotol, in much the same way, though it seems to be more valuable, as well as less expensive, than the carbonate of guaiacol. My experience with it, however, has been comparatively limited.

I wish to emphasize the opinion based upon the somewhat careful study of a series of cases, that simple creosote, judiciously administered, is often decidedly more valuable in promoting appetite and digestion than these compounds of the drug which are tasteless and comparatively inert in the stomach. Moreover, I have often observed in those suffering from constipation, a condition so common in tubercular patients, a marked improvement after the use of creosote for some time. A corresponding improvement in this respect has not been so frequently noted under the carbonates of guaiacol and creosote. The explanation is perhaps to be found in the action of simple creosote upon the stomach in addition to that upon the intestinal canal.

We should not be too readily turned aside from our practical convictions by arguments based largely upon theory, especially when urged by somewhat of an apparently commercial motive. In the treatment of tuberculosis I have come to look upon carbonate of guaiacol and carbonate of creosote as of secondary value compared with simple creosote.

In deference to a very respectable opinion and to a rational possibility, it may be quite proper to give as large doses of creosote as possible to those whose digestive functions are not thereby disordered. This may be done upon the theory and hope of obtaining a general antiseptic and anti-tubercular action in addition to that upon the alimentary tract. While, in my experience, this plan of giving creosote has in some cases been followed by improvement apparently additional to that resulting from increased nutrition alone, yet it is always, in the presence of such increased nutrition, difficult to estimate the relative value of any other actions of the drug. Perhaps the best estimate of such relative value may be made from a study of cases in which large doses of creosote are given without marked benefit to the digestive organs. Under such circumstances the largest doses given by inunction, by enema, and by hypodermic injection, as well as by the stomach, will not do very much good. I think I have yet to see a case of pulmonary tuberculosis markedly benefitted by the creosote treatment in the absence of alimentary improvement. Anyone will, I think, not have to study many cases under these conditions without coming to a similar conclusion. The elaborate and accurate investigations of Freund upon the digestive processes in consumptives and upon the influence of creosote on these processes, tend strongly to confirm the view that its beneficial action is exerted chiefly upon the alimentary tract.

So long therefore as appetite and digestion remain good, it may be proper to increase the creosote and to continue the large doses for some time. Perhaps the best plan is that indorsed by Anders, and which I have often followed; to occasionally run rapidly up to large doses where the drug is well tolerated, continuing thus from one to several weeks, and then to drop back to small or moderate quantities. The experience and advice of such a competent and judicious observer are not to be despised.

Contrary to the statement of Lawrence Flick, I have not found creosote of special value, certainly not especially available, in the advanced, septic stages of tuberculosis. The reason has seemed to me to be, that in many cases, especially chronic cases, the drug disturbs the digestive organs already weakened by the long enfeebling disease. At best it can be given in but small doses, and often its administration by the stomach had best be abandoned as productive of more harm than good. Here, it seems to me is, if any, the particular field for its administration by other channels.

Tuberculous patients suffering from the abuse of alcohol will seldom bear creosote well. It usually disagrees with their digestive organs, their livers and alimentary mucous membranes being already over stimulated and irritated to the point of disease. A similar thing has, in my experience, been true of tuberculous patients suffering from Bright's disease, diabetes and some other chronic maladies.

In several cases of tuberculosis complicated with diabetes, I have therefore, apparently without benefit, given the carbonate of guaiacol or carbonate of creosote, not however especially for their anti-tubercular effect, but chiefly with a view to counteracting abnormal intestinal fermentation.

In general, antecedent or coincident disease which has seriously impaired the digestive organ does, apparently for that reason, often interfere and contraindicate the use of creosote. And with this thought in mind we must be especially cautious about imposing upon important organs and functions already weakened. To do no harm is one of the first rules of therapeutics.

In conclusion, the creosote treatment of tuberculosis is the product partly of theory, partly of experience. The theories in regard to its action, especially its germicidal action, have not been substantiated either by laboratory experiment or by the clinical test. Clinical experience proves it to be valuable, certainly most distinctly for its effect upon the digestive organs. A clinical experience also clearly indicates that upon this action is its use to be chiefly guided.

It is an important matter. Many physicians are relying upon the creosote treatment for tuberculosis. We should ask them and ask ourselves what it means. We should speak to the profession and to ourselves, asking whither, and why, and how.

Let us not deceive ourselves. In whatever forms we administer this drug, we are giving them for the creosote that is in them. And we give the creosote chiefly to fulfill the first indication in the treatment of the consumptive patient, to promote his nutrition. For the physical man being consumed, having as yet no more sure redemption, shall live by bread alone.

Indianapolis, Ind.

ORIGINAL TRANSLATIONS.

WHAT CAUSES WERE RESPONSIBLE FOR THE FAILURE OF TUBERCULIN-THERAPY IN 1891?—A CRITICAL REVIEW.*

BY DR. PAUL FRIEDRICH KRAUSE, PRAKT. ARZT IN VIETZ A. D. OSTBAHN.

The views of the medical profession regarding the value and the importance of Koch's old tuberculin have, during the past few years, experienced a change. The number of those who have successfully used the remedy has increased, while the utterances of its opponents have constantly become less numerous. At the Tuberculosis-Congress, held in Berlin, in May of the present year, where the highest talent of the profession was attracted by the fight against consumption, were heard only voices warmly advocating tuberculin; not a single opposing voice was to be heard. In the great mass of practitioners the unwavering enemies are much more rarely to be found. The majority no longer oppose it, but merely hesitate, and one usually finds, as I, in many conversations have found, that the reason for this hesitation appears to be the recollection of so few encouraging results of the first tuberculin-era.

It occurred to me, therefore, worth while to study the literature of 1891, to determine wherein lay the cause of this great fiasco. I argued that such an investigation must strongly indicate whether the source of failure was to be sought in the character of the remedy or elsewhere. I therefore undertook to study all the articles appearing, in 1891, in the Deutsche medicinische Wochenschrift, Berliner klinische Wochenschrift, and the contributions of Hansemann in the January number of the Therapeutische Monatshefte. These papers gave such a clear and exhaustive presentation of the subject that I found it unnecessary to go over the remaining literature of 1891. The negative results of the first tuberculin epoch are to be accounted for in two ways. On the one hand the clinicians, with few exceptions, employed the remedy in a faulty manner; on the other, the post mortem findings, though properly de-

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scribed by the pathologists, were falsely interpreted by the profession and looked upon as injurious effects of the tuberculin.

The mistakes which were made by the clinicians consisted in the improper selection of cases, and the incorrect dosage of the remedy. All fevering cases are to be considered as positively unfavorable for tuberculin treatment. That fevering consumptives suffer from mixed infection has been shown by numerous investigations, especially in both of Petruschky's articles, "Zur Behandlung fieberende Phthisiker," 1 and 2 (Chariteannalen 1892 and 1893.) Most frequently the complicating micro-organisms are the influenza bacillus and streptococcus, occasionally also an encapsulated diplococcus resembling very closely that of Fraenkel. Recent researches have shown that the course of the disease is much more dangerous when two or more micro-organisms exert their destructive influence at the same time. I need only call attention to the malignant course of diphtheria when an invasion of highly virulent streptococci co-exists. He, who, for a long period of time, has been occupied, as I have been, with the treatment of tuberculosis in the stage of mixed infection, knows quite well that the appearance of high fever determines the date from which on life must be looked upon as lost, and when it can be reckoned by months. (Provided, of course, that proper measures for combatting mixed infection are not successful.) On purely theoretical grounds, it is self-evident that those patients who are already weakened by the continual circulation of poisons through their systems, will become still weaker when new inflammations are produced by the further addition of toxins. The masceration of the tissues, such as a tuberculin reaction serves to produce, creates an unexcelled culture medium—especially for streptococci.

If one looks over the case-histories of 1891, he finds that the existence of high fever was generally not considered as a contra-indication for the administration of tuberculin. I select from this abundant material only two very instructive cases.

In a case from von Leyden's clinic (1), in January, 1891, a paracentisis was made on account of a pleuritis, revealing a clear serous exudate. Furthermore, the examination showed in the right apex "dull" rales, a relatively dull percussion note with a slightly tympanitic character, and diminished respiration; also a splenic enlargement. January 17th, the day of paracentisis, the patient had a temperature of 38° C. (100.4° F.); on the 18th, a temperature of 39.2° C. (102.5° F.); and on the 19th received an injection of 2 mg. of tuberculin. By February 12th, he had received 10 injections, which by this time had been increased to 50 mg. During the injection period the general condition became rapidly worse. On February 10th the fever reached 40° C. (104° F.) where it remained continuously till the 19th, when the patient died.

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(1) Berliner klin. Wochenschrift, page 237.

A second case, which at that time excited considerable comment, was a case of tuberculosis of the tongue, described by A. Fraenkel (1). It was argued that if the remedy could accomplish anything, the action could be here most readily observed, for one could follow the progress in the ulcerated surface nearly as well as under the microscope. In the course of treatment, the tuberculosis did not heal, nor did the ulcer show any tendency to cicatrize. Thereupon the conclusion was reached that the remedy was a failure. Now, according to Fraenkel's report, the patient's fever ranged in the neighborhood of 38.5° C. (101.3° F.) and the slough of the ulcer was not examined for the presence of complicating bacteria. I would not miss the opportunity of referring at this point, to Petruschky's observation that other cases of superficial tuberculosis, indeed the most stubborn types of lupus, which show the greatest tendency to relapse, are usually combined with a staphylococcus infection of the deeper ulcerating tissue. According to our present knowledge there can be no doubt that Fraenkel was dealing with a case of tongue tuberculosis with mixed infection,—a case unfavorable for tuberculin treatment.

The existence of dangerous mixed infection does not always manifest itself by fever. The most careful sputum examinations, which have for a number of years been carried out in Koch's institute, have shown that secondary bacteria have often already localized themselves in the lungs without the patients having any elevation of temperature. I have observed such a case myself since November of last year. It was a case that at the time presented typical symptoms of influenza. Otherwise, examination revealed a tuberculous affection of the left apex. In the sputum were large numbers of influenza bacilli and a considerable number of tubercle bacilli. It was possible in a few weeks to bring the temperature down to normal, and for months the patient was relatively well; then there appeared a second attack of fever, which ran a similar course to the first. Such attacks occurred in all three times up to the end of October, 1899. During this time I have made frequent systematic sputum examinations, and, even when the patient's temperature

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(1)Berliner klin. Wochenschrift, page 80.

was normal for weeks, I always found, besides tubercle bacilli, an abundance of influenza bacilli and occasionally streptococci.

If such a patient is treated with tuberculin, there originates the immediate danger that a previously harmless saprophytic process may in the turning of a hand, be converted into a most dangerous inflammation by the oedema and the thereby resulting closure of a previously freely secreting cavity. Undoubtedly this happened more than once in 1891, but cases in point, of course I cannot produce, for at that time sputum examinations were not carried out with the necessary accuracy, so far as the influenza bacillus is concerned, they could not be, since it was not discovered until the winter 1891-2. With regard to the material of 1891, I can only conjecture, however, I believe I do not make a mistake in including here a case which ran a very puzzling course, and which was reported by Virchow (1) on January 21st, 1891, to the Berlin Medical Society. The patient was a 54 year old man, who, in the summer of 1890, suffered from shortness of breath, and October 10th, of the same year, entered the Charite. Upon admission a right-sided pleurisy with exudation was found. From October 10th to November 12th the patient remained in the hospital without tuberculin treatment, during which time his condition was very satisfactory, having no fever and losing no weight. On November 26th he received 5 mg. and subsequently the same amount December 1st, 10th, 31st and January 9th. Each injection was followed by a marked reaction of 40° C. (104° F.). During this period the patient lost weight and fevered continuously from the date of the last injection. January 21st the patient died, the autopsy revealing an unusually extensive miliary tuberculosis. I shall not discuss here whether or not this could have been the result of the tuberculin treatment, for I shall later consider this subject in detail. In this particular case, the continuous fever after the last injection leads me to the conclusion that the tissues, in spite of the previous absence of fever, were already attacked by secondary micro-organisms, which then very rapidly performed their fearful work on the field of tuberculin reaction.

Parallel to the above considered group of cases, which, on account of mixed infection, was unfavorable for tuberculin treatment, is a second group, which is likewise unfavorable material for this remedy, but which, as a result of the faulty selection practiced in 1891, also received injections. This group includes all those cases in which the destructive changes were too far advanced. In fact, Koch pointed out in his first publication that the remedy should, by preference, be used in the initial stages. The suggestion was, however, for the most part, simply ignored. For instance, Virchow (1) mentions a case the lungs of which he demonstrated and found to be so full of caseous pneumonic foci that, had all softened and emptied out, there had been nothing left of the entire lung except a net-work of fine threads. The majority of the cases which Virchow could show post mortem, also those described by Hansemann, although not so far progressed, showed marked destructive changes. Considering that such extensive tuberculous ulcerations are usually complicated by mixed infection, we can, with our present knowledge, not expect any help from tuberculin, unless it be in those exceptional cases where the process is purely tuberculous. I have treated such a case which I described in my last contribution (2). The patient had an extensive lung infiltration; received a few doses of tuberculin; but the very slight reactions produced rendered the patient so weak that the treatment soon had to be discontinued. When the tubercle bacillus has extended its destructive work over a large area, the organism is no longer able to meet even the minimal demand of a mild tuberculin reaction.

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(1) Berliner klin. Wochenschrift, page 108.

I shall now turn to a consideration of the damage resulting from the incorrect dosage of 1891. In the first place, it must be emphasized that too much tuberculin was given in too short a time, and a condition thereby produced which we are today pleased to designate as, excessive intoxication, that is to say the organism is overloaded with toxins. For example, one of Ruetimeyer's (3) patients received 11 injections in 11 days, in spite of the fact that he had reactions of 40° C. (104° F.) and lost 11 pounds in weight. Naturally no organism can indefinitely stand such methods of poisoning. Ruetimeyer's patient is of still further interest. Five days after the last injection he still had morning temperatures ranging from 38° to 39° C. (100.4°—102.2° F.). He received in consequence of which at first no tuberculin, but on the sixth day was given an injection of 30 mg., which was followed by a reaction of 39.5° C. (103.1° F.). The patient grew still worse; received no more injections; on the seventh day after the last injection showed evidences of meningitis, and two days later died. The autopsy revealed meningitis acuta tuberculosa.

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(1) Berliner klin. Wochenschrift, page 82.
(2) Zeitschrift f. Hygiene u. Infections-kranheiten, vol. 32, page 79.
(3) Berliner klin. Wochenschrift, page 124.

In accordance with our present experience, such a method of tuberculin administration must be designated as mal-practice. However, at that time such methods were not the exception, but the rule. With few exceptions, the writers have set no value upon the subjective condition, appetite, body-weight and strength of their patients. Evidently every body believed we had a direct working remedy; such as the diphtheria-serum. It is true that Fuerbringer (1) recognized quite early the dangers of pushing the remedy too fast. "I have at my disposal a large number of patients, who, under the action of relatively frequent, at the same time progressive doses, grew worse from day to day on account of accumulative intoxication. They picked up and recovered as soon as I began to allow a week instead of a day to intervene and ceased to progressively increase the doses." Biedert (2) also claimed that the patient was injured as a consequence of the cumulative action of too frequent and too large doses. But, as already mentioned, such observations stand almost alone in the great flood of literature of 1891.

A second mistake, which is of even more importance than the extreme intoxication, was made in the administration of tuberculin in 1891, by allowing altogether too high reactions to occur. The associated marked rise of temperature, of itself, injured the organism. In every sick person, and especially in tuberculous individuals, a high temperature interferes with nutrition and thereby causes a loss of strength.

Then,too,must be enumerated the local results of high reactions, which exercise an unfavorable influence over the so-called tuberculous granulation-tissue. It is well known that tuberculin has no effect upon the actually tuberculous tissue (the tubercle with its necrotic centre), but only upon the newly formed tissue which is richly supplied with blood vessels and surrounds the tubercle. Here it produces an inflammation, which, according to the intensity, presents various very characteristic pictures. Biedert (3) says that when the irritation is moderate, an increased cell growth takes place in the encapsulating wall of the tuberculous process. If the inflammation is more intense, marked exudation occurs, while in the stage of extreme inflammatory irriation cell death, necrosis, results. The bodily temperature furnishes us a means of determining the character of the local inflammation; the higher the fever, the higher the general reaction, also the more intense the local irritation. If long continued, high reactions are produced, extensive areas of granulation-tissue are "killed" and become necrotic masses. As a result, the following conditions develop:

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(1) Berliner klin. Wochenschrift, page 138.
(2) Berliner klin. Wochenschrift, page 197.
(3) Berliner klin. Wochenschrift, page 197.

The protecting wall is destroyed, the tubercle bacilli have non-tuberculous tissue before them which they may of course attack; a new eruption of tubercles takes place on this soil and in the immediate neighborhood of the original infiltration. On the other hand, the necrotic areas gradually change by further disintegration and whatever absorbable material they may contain is taken up by the body processes exactly the same as in caseous metamorphosis of tubercle. Undoubtedly tubercle bacilli can occasionally, by the process of absorption, reach the lymph and blood stream,—likewise analagous to the processes as they exist in caseous metamorphosis. That large numbers of tubercle bacilli can enter the circulation in this manner is not probable, for by this path they must usually pass through the lymph gland-filter, where they are held back. Upon the whole, it seems to be quite another question when there occurs during the course of phthisis an acute secondary infection. The latter seems to directly favor a fresh sowing of tubercle bacilli, probably because the lymphatic glands do not perform their normal functions. I mention here the preliminary report that Petruschky (1) made in May of this year before the Tuberculosis-Congress, according to which he has constantly observed fresh, miliary crops around old tuberculous foci in consumptives who had died with evidences of secondary infection, but who had never received tuberculin.

According to ideas which have up to this time been accepted, acute miliary tuberculosis occurs when a large number of tubercle bacilli passes directly into the blood stream or into the thoracic duct, be the direct cause, open vessels (as in haemoptisis) or the perforation of a pulmonary vein by a softened lymph gland. The time is not yet ripe for an acceptance of the recently proposed Wildt-theory, according to which acute miliary tuberculosis may also be produced when, under certain conditions, a few tubercle bacilli floating in the blood may become rapidly increased. In accordance then with the generally accepted opinion of the cause of acute, miliary tuberculosis, a tuberculin injection can therefore give origin to such a condition only when it produces a rupture of a large pulmonary vessel, which is the only probability which needs to be considered. Because a softened or tuberculous gland which had so far eroded the wall of a pulmonary vein that a tuberculin reaction caused it to break through, would have, in short time, done the same thing without tuberculin. A reaction that produces a haemorrhage must be accompanied by a strong local inflammation, for only then could a vessel be brought to the point of bursting, (otherwise, when an already extensive erosion of a vessel is present, it would have in a little while bursted without tuberculin). Strong reactions and the associated intense local inflammation are, however, as I have often emphasized, disadvantages which do not exist in tuberculin itself, but which are dependent upon its incorrect administration, and which can be avoided. With the mild administration of tuberculin (which must be declared the only permissible method today) such accidents have never been observed.

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(1) Bericht ueber den Congress u. s. w. page 446.

One of the most important reports of 1891 concerning the local effect of high doses is that of v. Bergman (1), because his experiments were carried out in a most logical manner. In the treatment of lupus, von Bergmann found living, capable of developing, tubercle bacilli in the improved, in fact, in the almost healed portions of the skin. He therefore proceeded energetically with increasing doses, even when a soft, smooth, no longer red, but rosy hued skin lay under the fallen off scales, which, during the inflammation, had covered the diseased area. He hoped in this manner to remove the last trace of the disease (which appeared to be atrophying tubercles). "However, this end was not attained. For under a systematic and energetic continuance of the treatment we found that little nodules again made their appearance in the scar and periphery of the seat of the old disease; that they became larger, increased in number, further grew and finally disintegrated and ulcerated."

This series of experiments is exceedingly instructive. By the energetic administration of tuberculin, the last remnant of the granulation-tissue was killed and the result could not have been otherwise than observed by von Bergman in his cases. The tubercle bacilli which were in the skin were brought in contact with tissue which was absolutely free of tuberculosis and which had been robbed of every protection. In consequence of this they could play their specific role and, as a matter of course, new tubercles were the result. Had von Bergmann, instead of forcing the treatment, repeated the administration after a period of rest, he would have "stepwise" surely obtained the desired definite cure.

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(1) Berliner klin. Wochenschrift, page 398.

As to the dangers which threaten, with administration to the point of high reactions, when the tuberculous foci are in the lungs, I will return to Ruetimeyer's case. As already mentioned, this particular patient died of acute meningeal tuberculosis, 24 days after the beginning of the treatment. It is probable that a mixed infection, acquired during the injection period, hastened the course of the disease; for the patient had, on days when he received no tuberculin, morning temperatures ranging between 38° and 39° C. (100.4°—102.2° F.); but besides that, I consider it very probable that during the 11 days of daily injections, with temperature of 40° C. (104° F.), tubercle bacilli reached the blood stream from foci in the lungs. A few of these might have reached the pia and given rise to the acute tuberculous meningitis. Too high reactions were not the exception, but the rule in 1891. Thus Lazarus (1) reported a patient who received December 11th, a dose of 5 mg. with a reaction of 39.8° C. (103.6° F.); and he continued this dose till December 23d. Koerte, Jr., (2) tells of a four year old child who received six injections in 13 days. "The reactions were marked, but not severe. The child never had a temperature over 39.6° C. (103.3° F.)." Although it would be a simple matter to greatly increase these statistics, I think these examples will suffice.

Of all the voices raised against tuberculin in 1891, that of Virchow undoubtedly had the greatest weight. From a study of his deductions, made for the most part from demonstrations of preparations before the Berlin Medical Society, one thing impressed me, above everything else, that a very generally accepted idea amongst the German profession rests upon an error. In conversation I have quite frequently heard colleagues say, Virchow has declared and proven that the most essential disadvantages of tuberculin lay in that there may, at any time, be produced an acute miliary tuberculosis. That, Virchow never said. He simply supported his post-mortem findings and emphasized that since the beginning of the tuberculin treatment"miliary tuberculosis has become conspicuously frequent." The term "miliary tuberculosis" was used by Virchow, as the context shows, in a strictly pathological-anatomical sense, and means nothing more than that in the various organs of the body "miliary or submiliary nodules were observed." In speaking of the relation between his findings and the injections he cautiously expressed himself in a suggesting manner only (1); "I have only shown what we have found; I believed—and I think there is here sufficient evidence—that this exhibition would show the magnitude of the danger which might arise. How frequently this danger arises, in what cases it arises, by what it is especially caused, are questions that can be definitely decided only after long research." In order that they might account for these miliary tubercles, so frequently observed, Virchow and his pupils, especially Hansemann, assumed that the eruption of tubercles occurred regularly during the injections. For this assumption are both master and pupil without a proof, because pathological anatomy has not yet found a criterion by which one can determine the age of a tubercle.

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(1) Berliner klin. Wochenschrift, page 83.
(2) Berliner klin. Wochenschrift, page 85.

An experience of Virchow's in 1891 gives striking evidence how cautiously we should adopt clinical deductions drawn from the results of an autopsy. With regard to the lung he demonstrated (2), he expressed the opinion that in a very slight affection of one apex which one could consider as older, a number of quite fresh, caseous, ulcerating changes present must have originated during the injection period. But, in truth, during life this case was as follows (3): Patient had several times had bloody expectoration; August 30th, haemoptisis of 1.5 litre blood; November 24th, 1890, marked emaciation, bad appetite with nausea, morning temperature 39° C. (102.2° F.), evening temperature 40° C. (104° F.) and over, in spite of antipyrin; morning pulse 130, smaller than before; dyspnoea. Right lung, anterior—over clavicle and first intercostal space marked tympanitic note with Winter's changing note, amphoric respiration, metallic rales; downward,—marked dullness, bronchial respiration and metallic rales quite to the lower border. Right side, posterior—marked dullness; above,—amphoric respiration and metallic rales almost to the angle of the scapula; below,—dullness, indeterminate respiration and moist rales. Left lung, anterior,—dry rales above clavicle and in the first intercostal space and below this dry rales; behind and above,—few soft moist ronchi; below,—suspicious. Liver and spleen dullness, somewhat increased; urine without albumin. November 27th, began injections; February 10th, death.

From this detailed report, made three days before the first injection of tuberculin, it would be difficult to come to any other conclusion, than that there had been a somewhat more extensive process than the slight apiceal affection, Virchow supposed to have existed. In addition, I wish to call especial attention to the existence of high fever, an undoubted evidence of secondary infection. I have already mentioned that this, even in the absence of tuberculin injections, favors fresh miliary crops of tubercles.

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(1) Berliner klin. Wochenschrift, page 191.
(2) Berliner klin. Wochenschrift, page 213.
(3) Turban. Berliner klin. Wochenschrift, page 347.

In one of his lectures, Virchow (1) speaks of the action of tuberculin thus, "To again recapitulate, firstly, up to this time we have no observations that the tubercle bacilli as such are killed, or perhaps dissolved; secondly, we have no direct facts which prove that a resolution of genuine tuberculous tissue takes place, that the tubercle itself as such can be absorbed. Thirdly, we have a large number of observations which show that a rapid disintegration of both tubercles and the surrounding zone of reacting tissue may be brought about by the remedy and that this disintegration may offer the possibility of a relatively early cure. On the other hand, we have no experience to show that indurations may be favored, or that the encapsulation and enclosure of caseous parts, with fibrous tissue is hastened. Further than that I can well say, that now and then the suspicion has arisen that the remedy mobilized and made active already encapsulated masses, and in this way converted an at least apparently innocent focus into an actual danger to the patient."

Of these statements, the first and second are certainly correct and stand unquestioned today; the third can no longer be acknowledged. Tuberculin exerts a destructive action over reacting tissue in excessive doses only; a cure is never based on this destruction of tissue. That Virchow never saw beginning indurations is accounted for in this way; by improper dosage, too high reactions were obtained and coincident with them the granulation tissue, which should have gone to do the work of encapsulation, was destroyed. When Virchow, in a very guarded manner, speaks of the possibility of the mobilization of an encapsulated mass, it must be remembered that he spoke only of a "suspicion," and of "apparently innocent foci." Evidently Virchow found something which he could not unravel and which he tried to account for by hypotheses. His remarks have the value of a purely personal, but not proven conjecture.

What was the outcome of this? What a disturbance the "mobilized tubercle bacillus" has created in the medical world! I can, from personal experience, assert that it is, even today, the foundation upon which many opponents of tuberculin have builded their scientific structures.

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(1) Berliner klin. Wochenschrift, page 192.

In all the demonstrations and lectures on Koch's remedy published by Virchow in 1891, there is only one prominent feature, that during that time, miliary tuberculosis of the various organs was observed with conspicuous frequency.

Virchow did not give a conclusive explanation, that will bear the test of analysis. At that time it was almost impossible to give a correct explanation; with our present knowledge, it can be given without difficulty. It is evident that both of the disadvantageous features of tuberculin worked together to bring about the condition found in the cases autopsied by Virchow,—too high reactions produced necrosis of the granulation-tissue. Part of these patients certainly had tuberculous foci in other organs which, on account of the destruction of the granulation-tissue, were the source of eruptions of new nodules. Then the course was further complicated by the few isolated tubercle bacilli which through the partial absorption of the many caseous foci, gained access to the blood stream, and were deposited in other organs, giving origin to new tubercle formation. The intensity of this process was greatly increased by the frequent presence of mixed infection. And so it had to result that the faulty application of the remedy, instead of producing the desired limitation, gave rise to a propagation of the tuberculous process.

Of the remaining threatening complications which Virchow imputed to tuberculin, one deserves a detailed consideration,—aspiration-pneumonia. As is well known, Virchow assumed that softened, caseous spots resulting from the use of Koch's preparation were not coughed out IN TOTO, but were partly aspirated from the bronchi, thus giving origin to multiple pneumonic foci, with caseous hepatization. Admitting the possibility of such an aspiration, the deduction seems somewhat forced.

Let us weigh this question. What happens when caseous material is forced into the alveoli? The caseous material itself is inert and has no effect; the contained tubercle bacilli are usually already dead; should, exceptionally, still virulent tubercle bacilli be present they would produce an exudative process, and thus occasion hepatzation, which would finally undergo caseous metamorphosis. That would require much time, for it is well known that the tubercle bacillus works very slowly, therefore, in the short time required for a few tuberculin injections such a process could not arise.

We have quite another picture when a mixed infection has already existed in the lung before the beginning of the injections.

Baeumler (1) published a series of cases in which acute broncho-pneumonia developed from the aspiration of cavity-contents or of pus from a suppurating lympatic gland, which had perforated the trachea or bronchus. Part of these had been in relatively good condition before the appearance of the complication. The autopsy and subsequent bacteriological examination showed that not the few tubercle bacilli present, but the enormous numbers of the strepto-and staphylo-cocci were re-responsible for the pneumonia. A careful retrospection shows that at exactly the time of the first tuberculin-era the influenza epidemic swept over Germany. When we, with the support of Baeumler's observations, consider that in 1891 that the healthy, and to a much greater extent, consumptives harboured large numbers of influenza bacilli in their lungs; when we recall the severe pneumonic changes caused by the influenza bacillus, we must of a necessity come to the much more obvious explanation, that Virchow's so-called aspiration-pneumonias were not due to a specific alteration brought about by tuberculin, but to the presence of an already existing invasion of secondary micro-organisms—probably for the most part influenza bacilli. The injections may have hastened the process, but they could not of themselves have evoked the process. I take this opportunity to cite Finkler, who in his able article (2) expresses himself in a similar manner. "I personally have no doubt that influenza at that time played us a bad trick, which we did not recognize, for then we did not have the advantage of a bacteriological diagnosis of this sneaking disease."

Furthermore, let it be here again emphasized that tuberculin dare not be used in such cases. The other, up to this point unmentioned dangers, from which Virchow and others vindicated tuberculin can be quickly disposed of. Cantani (3) contended IN EXTENSO,—easily ruptured, superficial cavities might rupture and, if no pleural adhesions were present, give rise to pneumo-thorax; if much dead tissue was thrown off cavities might result; deep intestinal ulcers encroaching on the peritoneum might perforate and cause perforation-peritonitis, et cetera. It is self evident that all of this might happen of its own accord. Virchow (4) in one place very correctly said, "I think that we may now with certainty say that any process that can be brought about by tuberculin, can also come about without that remedy. But the course (of these processes) certainly often seems to be extraordinarily hastened." Now this hastening is always the result of too intense use of the preparation, and, by proper dosage, can be avoided with certainty.

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(1) Deutsche med. Wochenschrift, 1893, No. 1.

(2) Finkler. Infectionen d. Lunge durch Streptokokken u. Influenza-bacillen, page 99.

(3) Berliner klin. Wochenschrift, page 221.

(4) Berliner klin. Wochenschrift, page 191.

I shall not concern myself with all the other writers, be they clinicians, or be they pathologists, who expressed opinions against the use of tuberculin, because their views have, in all their essential points, been covered in articles already discussed. I must busy myself yet only with Virchow's pupil, Hansemann. Hansemann (1) has expressed himself in two places concerning tuberculin. For the most part his views coincided with those of Virchow. I shall not discuss the few differences, for they are unimportant. However, I would like to throw the full light of day upon his following declarations: that he never saw an indication of encapsulation, and that in consequence of which one had to assume that the necrotic suppurating foci were absorbed; that this was made especially easy by the nearness of blood and lymph vessels, or when the disintegrated tubercle was located on the wall of a blood or lymph-vessel; that thus results a dissemination of tubercle bacilli which causes miliary tuberculosis—observations he has frequently made during the injection period.

Hansemann concluded these reflections with the following: "The pathological conditions brought about by Koch's remedy, under conditions which can never be previously determined, endanger in the extreme the lives of the tuberculous, especially of those in the very first stages." In a second place he expresses himself as follows:—"When the disintegrated tuberculous tissue cannot escape outward, it must be either encapsulated or absorbed. The former process has never been observed. If the latter takes place, the contained tubercle bacilli—which have not been deprived of their virulence—must pass into the circulation and lead to further eruption of tubercles. All of these facts force me to the conclusion that the Koch method can, under certain conditions, cause the outbreak of acute miliary tuberculosis."

Tot verba, tot errores! In the first place, Hansemann speaks as though the absorption (which is only hypothetical) of "necrotic suppurating" foci took place without difficulty and in the most rapid tempo,—

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(1) Berliner klin. Wochenschrift, pages 122 and 123.
Therapeutische Monatshefte, 1891, page 77 ff.

much as a subcutaneous injection of morphia is absorbed and carried into the blood stream. He keeps silent about the important obstruction offered by the bronchial lymph glands, which lie between the foci, to be absorbed, and the vascular system. Then, in a questionable manner, he conveys the impression that the usual causes of absorption are the nearness of the lymph and blood vessels, or the location of softened tubercles on the walls of the blood or lymph vessels. Just as though these relations, with intact vessel walls, were of any significance! I have previously emphasized under what conditions danger threatens the organism from haemoptisis, or in rare cases from the advent of a genuine acute miliary tuberculosis.

Furthermore, Hansemann, by a skillful twisting, identifies the frequently observed appearance of miliary nodules with his theory of absorption and consequent dissemination of tubercle bacilli, and simply asserts that he has frequently seen the latter during the injection period. Then his thoughts make a daring leap. On account of the dangers threatened by absorption of suppurating necrotic foci (therefore, in advanced cases) he concludes that the Koch preparation endangers the lives of the tuberculous, "especially of those in the very first stage." Indeed! How then? In the very first stage there are no necrotic suppurating foci.

But the worst of all his misrepresentations was finally committed by Hansemann in his article that appeared in the Therapeutische Monatshefte. Here he makes out of a "miliary tuberculosis," as seen by Virchow and subsequently also by himself, an "acute miliary tuberculosis." He therefore confused the pathological picture with a clinical conception, which has an entirely different significance. That is indeed an unparalleled "juggling" of words.

It is remarkable that, in 1891, nobody showed up the false representations of Hansemann's reports in their true worth; on the contrary, men otherwise well versed in the study of tuberculosis—as Baumgarten—accepted Hansemann's deceiving conclusions as whole cloth, and even today the ghost of miliary tuberculosis, following tuberculin injections, causes mighty shudders in German professional circles. This state of affairs is all the more remarkable, considering that the adverse criticism did not come from a noted specialist—who in this case, of course, must be a clinician—but from a pathological anatomist. Well nigh the entire German medical world is in a condition which I can designate in no other way than as "pathological"; they suffer from an overestimation of the significance of the science of pathology in the domain of medicine. Virchow once said, the pathologist is above the practitioner, just as the expert is above the judge. This comparison is in reality a lame one, for the judge, by virtue of his right to estimate the weight of evidence, is superior to the expert. In any event, the pathological-anatomist should be denied a superiority over the clinician. Alas! God help us! This condition exists today; the German profession catch up every word that falls from the pathological-anatomist's lips with a trusting devotion, as if all our reliable information came from that source alone.

However, it is not to be denied that, of the helping sciences which the physician must control, pathological anatomy stands in a high, perhaps in the first place, but absolute lord of the domain of medicine, the ministering, healing physician is and always shall be. I would that the German physicians more universally possessed this feeling of pride. More personal inquiry and less faith in authority! Thereby had we been spared that not very elevating drama of the year 1891. Because Koch's authority stood behind it, everybody took up a newly discovered remedy with a trusting enthusiasm, and, after a little while, on Hansemann's authority, threw it aside without personally weighing the evidence.

A very worthy colleague who treated a series of cases, in the hospital under his direction with tuberculin, in 1891, and later gave up the remedy, once expressed himself as follows: "If it is an error to use the preparation in large doses, and if the resulting necrosis of tuberculous granulation-tissue means a severe injury to the patient, then Koch and Koch alone must bear the blame of this faulty method of administration, for he recommended it to be used in this manner." I think this view was quite general, and I therefore mention it. In the first place, we must not forget that Koch himself stood before a puzzling novum, when he made his first report in 1890. He possessed no extensive experience, based on long observations, but could, for well known reasons, no longer keep the new preparation a secret. He therefore gave out for publication an unfinished, yet nascent matter. Naturally, he sought to give an explanation for the peculiar process which took place before his eyes in lupus and also for the unquestionable improvement he observed in beginning phthisis. So he assumed that by his preparation the tuberculous granulation-tissue was killed, and with it the bacillary cause of the disease was either thrown off or brought into such unfavorable environments that it could no longer exist.

That this hypothesis is only in part correct, is without doubt well established. But can one rightfully reproach Koch because he falsely calculated in a purely incidental matter? I am firmly convinced that had some one in 1891 come to Koch and said, "It is true that your remedy has a specific action, but I can prove to you that your idea of its method of working is false," Koch had without hesitation answered, "Good; I acquiesce, then let us discard my explanation, and in the future try to avoid the necrosis." It is hard to find another from whose personality the dogmatic is so far removed as from Koch's. He demands of a remedy nothing further than that it helps. How this may come about, is, to him, of secondary importance.

I will emphasize it again, Koch gave utterance to only a purely personal conjecture when he expressed himself regarding the manner in which tuberculin worked in the organism. Under no circumstances did he wish to give an iron-clad therapeutic rule, from which one dared not deviate. On the contrary, he awaited from the German profession an unbiased controling of his observations up to that time, and so, a further co-operative investigation in this newly found field. That matters took such a different course; that the new discovery, the full importance of which could perhaps be appreciated only in the remote future, was, after a superficial trial, attacked hammer and tongs; that was, I believe, the greatest pain and the most bitter disappointment Koch ever experienced in the course of his learned existence.

The unfavorable reports of different clinicians, in the year 1891, were offset by a large number of observations of other clinicians, who obtained very favorable results; for example, Guttmann, v Bardeleben. Albrant saw, in the Schoeler clinic, the complete disappearance of a conjuctival tuberculosis; likewise, Landgraf (1), that of a tuberculous tumor of the uvula. Renvers (2) obtained the cure of a patient whose epiglottis, pharynx and mucous membrane, over the arytnoid cartilages, were beset with sharply bordered ulcers. Koenigshofer and Maschke (3) could show in all their cases a prompt general and local reaction. "As a consequence of this reaction we have in all cases had a distinct improvement, and in corneal ulcers, obtained a complete cure." Both authors employed small doses, 0.5 mg., only. Others also quite early recognized that Koch's preparation could not be employed in a routine manner, but only in a strictly individualizing manner. Rumpf (1) declared that above and before all this treatment was indicated in only those cases with limited extension of the process and the better the general condition (nutrition and chest formation) the greater the indications. Koehler and Westphal (2): "According to our opinions, not the Koch preparation in itself, but the faulty method in which we employ it, is responsible for the arising of these dangers." Guttmann and Ehrlich (3) recommended 0.1 mg. as a beginning dose. Grabower suggested small doses with longer intermissions. Cantani (4) called attention to the existence of a local reaction without a fever reaction; because there was an extension of the moist rales, more frequent cough and more abundant expectoration. By means of Arnheim's thermometer, Cantani was sometimes able to show an increase of several tenths of a degree of the skin temperature in the region of the diseased apex. (A very interesting parallel to v. Bergmann's observations in brain abscess, in which the skin temperature of the affected side was sometimes a whole degree higher than on the unaffected side.) Langenbuch and Wolff (5) pronounced the high reactions as superfluous and injurious. The dosage should therefore be so regulated that only a scarcely appreciable elevation of the temperature may evidence the action of the tuberculin. These authors employ tuberculin in connection with picric acid and sublimate and find the healing properties to be about 50 per cent. greater than from tuberculin alone. Their results in 198 cases, the half of which were treated with and half without tuberculin, are as follows:

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(1) Berliner klin. Wochenschrift, page 285.
(2) Deutsche med. Wochenschrift, page 512.
(3) Deutsche med. Wochenschrift, page 76.

99 Cases Without Tuberculin.	99 Cases With Tuberculin.
45 Died.	21 Died.
45 Improved.	40 Improved.
0 Unchanged.	5 Unimproved.
9 Cured (?).	33 Cured.

But all favorable reports were for the most part quickly forgotten and favorable progress toward procuring an exact, victory-bearing method of tuberculin administration ceased after the pathological-anatomists had passed judgment. The practitioner humbled himself before the theorist.

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(1) Deutsche med. Wochenschrift, page 115.
(2) Deutsche med. Wochenschrift, page 842.
(3) Deutsche med. Wochenschrift, page 373.
(4) Berliner klin. Wochenschrift, page 221.
(5) Deutsche med. Wochenschrift, page 935.

The conclusions of the above I sum up as follows: The failures of the first tuberculin epoch are, without exception, the result of the improper methods at that time employed in the administration of the remedy. For that reason no one is justified, on the grounds of the experiences of 1891, in passing adverse judgment upon the remedy. On the contrary, it is important that the remedy be extensively tried anew, in accordance with the now accepted indications. For thereby entirely different results than those of 1891 will be obtained and the medical profession will be richer by one valuable remedy.

TUBERCULOUS AFFECTIONS OF THE SKIN.

(Continued from page 156.)

BY PROFESSOR DR. JADASSOHN, DIRECTOR OF THE DERMATOLOGICAL CLINIC AT BERN

We have thus far confined our study to that portion of our subject which may be scientifically demonstrated as actual tuberculosis; where although the isolated case may often enough make us difficulties, the general type does not. Essentially inadequate is our knowledge of those affections, which we are about to consider, and which have during recent years called forth animated discussion. We refer to those affections in which the relation to tuberculosis rests partly on a clinical and partly on a histological basis, but in which thus far the attempts to scientifically demonstrate their tuberculous nature has either completely failed or at best has succeeded in only a few cases.

Dermatologists, especially in France, have looked upon this class of affections as dependent for their origin upon the tuberculo-toxines; and have given them the names of tuberculide, scrofulide and exanthem of tuberculosis,—while from their analogy to the so-called parasyphilitic affections they have also been termed paratuberculous dermatoses. That very chronic, and—if the expression is allowable—"specific appearing" affections of the skin may be caused in predisposed individuals is shown by the atypical iodine and bromine exanthems with their tumor-like proliferations.

The toxin-hypothesis rests solely upon the demonstration—made with greater or less certainty according to the case—that these affections occur only, or in the great majority of cases, in individuals who are otherwise tuberculous; and that bacilli and virulent disease-products are absent. Neither of these arguments is convincing.

The connection of tuberculosis with the first of these affections about to be discussed, the so-called lichen scrofulosorum, is incontestable. As a matter of fact, despite the very large number of these cases, I have known of scracely a single case which did not exhibit other evidences of tuberculosis. This exanthem which affects by preference scrofulous or tuberculous children consists of hardly perceptible pale-red or yellowish papules or small pustules arranged mostly in groups. More rarely scaling macules, which resemble psoriasis, parasitic eczema or pityriasis rosea, constitute the exanthem. While these last named lesions may undergo resolution with or without a minimal degree of atrophy, as a whole they pursue a chronic course. In many cases hardly any collateral phenomena are present. In the histological examination of these efflorescences, the Langhans giant-cells are often found in the miliary infiltration papules. As I myself have often found, these lesions give a perfect local reaction to tuberculin, and apparently under the influence of this reaction, new lesions may develop upon previously smooth skin. I am forced to assume, however, that under these circumstances the lesions were already present in the latent state (1). A priori objections to the recognition of this exanthem as an actual product of the action of the bacilli have but little significance. We know that tubercle may undergo spontaneous involution in other organs; and we may assume that, as in the case of acute miliary tuberculosis already cited, many bacilli occur, so here a much smaller number of micro-organisms reach the skin by way of the circulation and set up a more benign exanthem. In Pelagati's case the papules and pustules contained numerous bacilli and still the lesions underwent in part spontaneous recovery. For a long time, however, it was very difficult to demonstrate the essentially tuberculous nature of lichen scrofulosorum. Numerous microscopical and experimental investigations resulted negatively for me; a long time previously observed bacillus did not justify a decision. Now, however, we have a small number of animal experiments (1) with positive results, and one undoubted bacillary finding (2). These facts show much more than all the negative results, and it appears to me that the day is drawing near when we shall look upon lichen scrofulosorum as a miliary tuberculosis—extremely benign, it is true—and not as a toxico-derma; and shall be obliged to designate the affection as a tuberculoderma miliare.

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(1) In this connection the most convincing testimony is a case reported by me to the London International Dermatological Congress, 1896, (Transactions, p. 429). A lichen scrofulosorum was associated with a single erythematous ring of the size of a quarter which reacted to tuberculin and showed under the microscope a giant cell structure. After the use of tuberculin the lesion underwent complete involution, in that nothing of it was to be seen three months later. Later on, however, the lesion reappeared, of the size of a dollar, with the histological structure of tubercle. It is difficult to look upon this lesion as other than a peripherally spreading tuberculous affection.

It will be far more difficult to properly discuss the members of the second group of affections without a very thorough presentation and sifting of the facts. These diseases, the connection of which with tuberculosis is hardly to be doubted, are known under various names (hydrosadenitis, folliclis, acnitis folliculitis exulcerans, granuloma innommine, necrotic granuloma, etc., etc.,) consist collectively of acne-like efflorescences of many different kinds, which occur by preference in tuberculous patients (they co-exist occasionally with lichen scrofulosorum). Small, deep-seated, sharply defined papules, which slowly rise to the surface, undergo necrosis and heal with sharply margined round scars (especially in a characteristic locality on the ulnar side of the forearms and hands) (3); superficial papules, which rapidly become pustules and then ulcerate; and larger bluish-red oedematous nodules with tendency to soften,—these lesions constitute the chief types which may be associated in a multiform eruption. In this category also belong acne cachecticorum and scrofulosorum. Histological investigation may show a very uncharacteristic tissue or one which is in a high degree "tuberculoid" (4). In one case only have bacilli undoubtedly been seen (5); while in another instance a scrofuloderma, which co-existed with an exanthem, gave a positive result in animal inoculation (6). These results will not suffice to take these affections (whereof the clinical diagnosis is still difficult) from the group of "tuberculides" and class them with essential tuberculosis of the skin. They are sufficient, however, to place a large interrogation point after the toxin-hypothesis and to lead us to make more and more thorough histological and bacteriological investigations in all these cases.

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(1) Haushalter. Ann. de Derm. et de Syph., 1898, No 5, p. 455. Pellizzari. 3rd. International Derm. Congress, London, p. 425. Jacobi. Ibid, p. 431; and Verhand. d. deutsch. dermatol. Gesellsch., 1898, 486.

(2) Wolff. Verhand. d. deutsch. dermatol. Gesellsch., 1898, 496.

(3) These scars were extremely characteristic in one of many cases seen within the past few weeks—an atypical, acne-like eruption upon the body. The multiple scars, with location as described in the text, closely suggested a tuberculide. The diagnosis was strengthened by the co-existence of tuberculous cervical glands and a very marked tuberculin reaction.

(4) Verhand. d. deutsch. dermatol. Gesellsch., 1898, p. 492

(5) Phillippson. Giorn. ital. d. mal. ven. e d. pelle 1898. Mai.

(6) Touton, Verhand. d. deutsch dermatol. Gesellsch. 1898, p. 55.

The subject of lupus erythematosus has been made the occasion of a still more earnest controversy. Kaposi, as you know, has separated this affection into two entirely different types, viz: the discoid and acute disseminate. The former is distinguished from lupus vulgaris by the constant absence of typical lupus nodules, absence of tendency to ulcerate, presence of healing at the centre with cicatricial atrophy, predilection for the external ear and hairy scalp, and appearance in mature years. Nevertheless, in single cases considerable difficulty may be experienced in making the differential diagnosis. Tubercular tissue has been found but rarely in discoid lupus erythematosus and only in cases (in my opinion) in which the diagnosis cannot positively be made. Bacilli have never been found; the histological structure is usually entirely different from that of tuberculosis; and animal experiments have been wholly negative. In the great majority of cases recorded in the literature (in all of my own) the tuberculin reaction has failed to occur. Nevertheless, prominent dermatologists, especially in France, believe in an association between this skin disease and tuberculosis, and look upon the former as tuberculo-toxicoderma. On the ground of clinical experience they are forced to the conclusion that lupus erythematosus occurs by preference in people who are actually tuberculous or possessed of the tuberculous predisposition; and that an especially large per cent. of such indivdiuals die of tuberculosis. Statistical material upon this subject is relatively small. An esteemed Norwegian author, Boeck (1), who for a long time has supported the view under discussion, has found in 36 cases only 16 per cent. to 17 per cent. of individuals with erythematous lupus, who are free from tuberculosis, scrofula or tuberculous family history. In my own experience the percentage is considerably less than Boeck's 83 per cent.—84 per cent. Nevertheless, I have in recent years observed the frequent association of the affection with tuberculous cervical glands or scars (2), and cannot endorse the strict dualistic point of view of many dermatologists, any more that I can admit that the identity of the two conditions has been demonstrated.

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(1) Archiv fuer Derm. und Syph., 42. Bd. 1. Heft.

(2) I append here a short review of 32 cases of lupus erythematosus for comparison with Boeck's cases. Out of this number, 9 were or had been tuberculous. Cervical glands or consequent scars were found six times, lupus erythematosus was once found associated with lupus vulgaris (both affections characteristic), tuberculous bone, abscess once. suspicious apex affection once. In addition five patients exhibited a strong family history of consumption ; aside from other cases in which a history of disease was conceivable. In Broeck's

In the acute disseminate form of lupus erythematosus with the frequently associated erythema perstans, owing to the rarity of this type of disease, the difficulties are still greater. Many of the cases arranged by Boeck in this category belong with certainty to the tuberculides already described. In other cases, including one of my own, a connection with tuberculosis cannot be proved, and it is a question whether or not Boeck, Kaposi and others have not included under this name affections which are essentially unlike each other while yet possessing a strong clinical resemblance.

A clinical affection hardly recognized in Germany belongs to the dermatoses of tuberculous affiliation—the condition described by the renowned French dermatologist, Bazin, under the name erytheme induree des scrofuleux. It is characterized by bluish, firm and deep-seated nodes resembling the lesions of erythema nodosum, which occur with especial frequency in the lower extremities of young scrofulous girls who are forced by their occupation to stand long hours. These nodes pursue a very chronic course and may ulcerate. The very scanty histological investigations have thus far shown no tuberculous alterations. Last summer I myself saw a very characteristic case of this sort, in which a typical lichen scrofulosorum was present on the lower extremities and abdomen, and in which both the nodose lesions and the lichen reacted unmistakably to Koch's old tuberculin. The histological investigation also showed here and there the picture of tuberculosis. Recently Thibierge (1) obtained a positive inoculation result in a case of this sort which had undergone ulceration.

In a case reported in America the affection under discussion was associated with the acne-like tubercle already described (2). It appears, therefore, that many of these cases diagnosticated as erytheme indure belong essentially to tuberculosis.

From all that has been said, it follows that from among so-called tuberculides there are some in which an association with tuberculosis is

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material tuberculous cervical glands played a prominent part. We will not err in assuming that in any case the overwhelming majority of these cases were actually tuberculous. It is noteworthy that in Broeck's cases the great majority of patients were children or adolescents (eight out of twenty).

(1) Thibierge et Ravant, Etude sur les lesions et la nature de l'erytheme indure. Annal. de Dermat. et de Syphiligr. 1899. Juin. p. 513.

(2) J. C. Johnston, Indurated Erythema and Necrotic Granuloma in the same subject. Jour. Cutan. and Genito Urin. Dis. 1899. July, p. 311.

doubtful; while in the case of others, especially lichen scrofulosorum and the acne-like forms, the assumption is more probable that the localization of the bacillus and not tuberculo-toxin must be held responsible for the origin of these lesions in the integument. The demonstration of the bacillus in these tissues seems to be especially difficult in these particular affections; and the frequent spontaneous cure of these dermatoses appears to show that in this localization the bacillus tends to readily perish. This appears to be demonstrated by Phillipson's very exact studies upon a case which he looked upon as a thrombo-phlebitis tuberculosa, which certainly belonged to the tuberculides.

On the other hand, there appears in single cases before or at the beginning of an internal tuberculosis, a transient roseola-like exanthem which may well be regarded as of purely toxic nature (1). The connection between tuberculosis and a peculiar form of erythema nodosum, maintained by Uffelman, must be regarded as doubtful. The opinion may be ventured that the association of erythema nodosum with acute erythematous lupus may have led to this view.

Not much time need be given to certain other dermatoses, the tuberculous nature of which is even more doubtful than any of the affections already discussed. We may here enumerate pityriasis rubra Hebrae, which is associated with tuberculosis with marked frequency, and in two cases of which I found tuberculosis of the superficial lymph ganglia; the cachectic gangrene of the skin of childhood of which I have recently seen a case associated with lichen scrofulosorum; the various pigmentations which occur in severe cases of tuberculosis (exclusive of morbus Addisonii) and are known by the name of "choloasma cachecticorum," together with still more dubious pigmentary anomalies known as "leucoderma tuberculosum." A word may be given to the subject of so-called "scrofulous eczema." It must be confessed that children with tuberculous predisposition and those with tuberculous affections are especially subject to eczema. In some of these cases tuberculosis is already present, while in others it is not present or at least cannot be recognized. It is especially in eczema of the nostril and upper lip, that an intra-nasal investigation or more frequently the use of tuberculin, will reveal the existence of tuberculosis of the nasal mucosa. On the other hand, however, it must not be forgotten that the poorly nourished children of the lower classes are alike predisposed to tuberculosis and eczema, and that a neglected eczema paves the way for a tuberculous infection of the skin and the mucosae. Between insufficient nourishment, defective care of the skin (pediculi capitis), eczema and tuberculosis of the skin, mucosae, glands and viscera there often must exist an undoubted connection.

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(1) Bayet, A., Note sur les erythenes survenant au cours de la Tuberculose. Clinique. 7. VI. 1894.

A catarrh of the skin due to the immediate action of the tubercle bacillus is thus far unknown—and if Boeck claims that there is an eczema scrofulosorum, it must be said that the majority of the cases reckoned in this category are examples of lichen scrofulosorum without the typical papular formation,—histological study also leading to the same conclusion.

Gentlemen, I have given you, in brief outlines, the pathology of the tuberculous skin diseases. I have endeavored to distinguish between the scientifically certain and the hypothetical, and I have been obliged to refrain from the discussion of many interesting special questions. Still I trust that I have given you a good idea of the scope and manifold nature of this subject. I do not believe it necessary to illustrate by figures the practical significance of cutaneous tuberculosis. The numerous lupus cases which year in and out populate our dermatological and surgical clinics; the severe neglected cases which we find in infirmaries, show us sufficiently how many lives are blighted by lupus, and this form of tuberculosis has not only a medical, but also a great social significance. Lichen scrofulosorum and the acne-like exanthems may often enough indicate the presence of another and latent tuberculous affection. In many cases cutaneous tuberculosis is the only manifest, in many others the only actual symptom of the disease. A generalization of the bacillary disease can occur from a cutaneous focus as a chronic, and much more rarely as an acute process.

Of the tuberculous skin diseases, lupus scrofuloderma and lichen scrofulosorum are by preference, but by no means exclusively affections of early life.

The significance of heredity and infection is difficult to determine in cutaneous tuberculosis, principally because the same patient gives a family history of tubercle in addition. The prophylaxis of cutaneous tuberculosis coincides in many points with that of tuberculosis in general. Fortification of the child-organism, banishing all sources of infection in families which harbor a consumptive—these are matters which it is not necessary to here discuss. Especially important is the avoidance of cutaneous tuberculosis, an undoubtedly careful attention to and cleanliness of the skin, and proper treatment of infantile eczema. The fact that lupus is much more uncommon in the better situated classes than among the poor shows the prophylactic influence of care and cleanliness. Early energetic treatment of intra-nasal conditions would be the means of preventing many a case of cutaneous tuberculosis. The more the people are taught to consult medical aid in apparently insignificant ailments, and the better the physician is informed as to diseases of the skin, and especially tuberculosis, by so much more will the science of prophylaxis be advanced. The therapy of an already developed cutaneous tuberculosis is largely dependent on the precocity of the diagnosis. General measures, which we have applied to the warfare against tuberculosis with such good results, must not be neglected in the dermatological clinic. We employ the influence of climate, diet, balneology, creosote, cod liver oil, etc., etc., just as do the physicians who treat medical cases alone. This sort of treatment suffices for most cases of lichen scrofulosorum, of the disposition of eczema, and even of acne-like tuberculide (in which I have had good results); but other forms of cutaneous tuberculosis cannot be sufficiently influenced in this manner, although even lupus and scrofuloderma may show evidences of striking improvement and even cure under general management. We now possess many special plans of treatment which I will briefly indicate. A thorough consideration would naturally take us too far.

At the head of the so-called specific etiological remedies, the tuberculin treatment must be placed. The first Koch's tuberculin has given me, as well as many others, undoubted good results—a perfect cure has occurred only exceptionally when this means alone was employed, despite all modifications of the method. How far it may act as a synergyst with other therapeutic agents, it is extremely difficult to say, not only of the old tuberculin, but the new as well. With regard to the latter, my experience coincides with that of others—high degrees of improvement have been obtained without actual permanent cures. We must look forward to further improvement in this class of remedies.

We hear no more in this connection with regard to cantharidin, thiosinamin, pilocarpin, nuclein. Landerer himself admits that his preparations of cinnamic acid are more inoperative in tuberculosis of the skin than in any other localization. Results from thyreoidin are very doubtful. A number of French authors have claimed that mercurials have a specific action, and especially in the form of injections of calomel, to which we have already alluded. I have no positive results to report from this agency; I only know that in cases of doubtful diagnosis which afterwards were shown to be of tuberculous nature, both iodide of potassium and mercurials were inoperative, and more recently I have obtained nothing but negative results. I do not dispute the diagnosis of others, but to make certain that we have to do with lupus—often a more difficult and uncertain task than many believe—we should never omit to use the tuberculin test and also when possible animal inoculation should be practiced.

The discussion of local methods of treatment of cutaneous tuberculosis, and especially of lupus, leads to a more positive territory. At the outset I state an axiom which in the present state of our knowledge appears to be unassailable: At present the radical surgical treatment—excision—is the most certain and successful which can and ought to be employed. In isolated local foci there can hardly be a doubt as to the expediency of this method. Even in widely diffuse processes the modern technique of operation and transplantation in the hands of surgeons and dermatologists has lead to results hardly anticipated. The conditions for success in all operations involves the most careful avoidance of infection of the exposed surface and absolute control of the methods of transplantation and plastic surgery. The experience of Lang has taught that beautiful results can be obtained in this manner.

Nevertheless, we are seeking other methods and have to employ a variety; because there are patients who will not permit us to operate, while in other cases the extent or localization of the foci of the disease or the general condition of the patient make operative interference inadvisable. Localization on the mucous membranes is especially unfavorable for radical operation.

The methods of minor surgery, applied alone, have no longer any great repute. It is true that through repeated multiple scarification we may destroy a lupous focus—but the task is laborious, and while good cicatrices form the therapeutic results are incomplete. The method of excochleation with the sharp curette has not only the disadvantages of an incomplete result, but it also leads most readily to a generalization of the tuberculous process. We only recommend the curette in association with other measures. The method of boring out individual nodules with the trephine we employ only in connection with the cautery, but prefer for these isolated foci the exclusive use of the Paquelin apparatus, the "microbrenner," or galvano-cautery. The electrolytic destruction, which may also be employed in these cases, is hardly applicable for large foci. The stasis therapy of Bier—which could naturally be used only in lupus of the extremities—injections of iodoform, guaiacol, etc., have hardly found common acceptance for this purpose.

Of chemical remedies, nitrate of silver, caustic potash, Cosme's paste, and zinc chloride still play a great role as caustics in many clinics. However, modern methods which exert an elective action on the diseased tissue are more in vogue. Among these I may enumerate lactic acid, applied either in solution or in a paste (I use it particularly in lupus of the mucosae); the salicylic-creosote plaster; Unna's green ointment, and above all pyrogallic acid. With this last named remedy I can report the best results. I apply it according to the tolerance in a 5 per cent. to 20 per cent. ointment, after obtaining the anaesthetic action of cocain or orthoform. I have also found the Veiel's method of great value, following the action of the stronger ointment with the application of mild ointments, which secure a more perfect result while delaying the healing process. Unna prefers his method of boring into lupus tissue with wooden sticks which have been dipped into caustic fluids (sublimate, phenol, creosote, salicylic acid)—the surface being afterwards covered with mercurial-carbolic acid plaster-mull.

All these methods and many others, into which I cannot here enter, may lead to perfect results in favorable cases after a thorough and persistent trial. Relapses, however, are of frequent occurrence, but still may be kept in check by careful observation and after treatment. When the caustic treatment is applied with skill the resulting scars are very satisfactory.

Of much more importance are three methods of treatment which have been elaborated within the past few years, and about which the final word canot yet be said. Hollaender's hot air method, Roentgen rays and Finsen's photo-therapy. The hot air method rests upon the fact that by a proper application of superheated air lupous foci may be destroyed while the normal tissue is unaffected; by this means a complete cure may result with good scars. The original apparatus is a very simple one: Air is heated over a Bunsen burner and driven through a coil directly upon the affected skin. The operation is very painful, requiring deep narcosis. Some practice is doubtless required for the successful application of this method, otherwise the operator may do either too little or too much. Hollaender's results in comparison with his percentage of relapses are very favorable. I myself have seen several relapses where this method has been used, but will refrain from passing a final judgment upon the subject.

The treatment of lupus with Roentgen rays is also yet in its experimental stage. It is doubtless true that cases can be cured by this method and that a number of observers, including myself, have witnessed this favorable result. As to the rationale of this method we are in complete ignorance concerning it. The technique of the method is still far from complete. The sensitiveness of the rays apparently differs very much in different individuals and because of this it is necessary to be extremely cautious at the beginning of the treatment. Further, it occasionally happens that we get a cumulative action from the rays, so that we are surprised in the course of the treatment by the appearance of strong irritation and ulceration; these ulcers show a surprisingly slight tendency to heal. The final result, however, may be good in cases of this sort. Relapses may occur after the most vigorous treatment and apparent radical cure.

I cannot speak from experience with regard to the Finsen phototherapy. Our Danish colleague reports that he is able to fully heal lupus with the action of the chemical light rays. His experiments have been carried out in an admirably arranged light institute, and the numerous favorable results which he has obtained have been witnessed by competent colleagues who have visited the Copenhagen Institute. That the chemical light rays are able to favorably influence lupus may be regarded as something absolutely proven; but whether this is brought about by the bactericidal action of the light or by inflammation caused by the chemical rays must as yet be left to conjecture. The treatment is effectuated by sun rays or by rays of strong arc lamps, the light passing through lenses which are provided with cupric sulphate light-filters, or more recently through rock-crystal lenses. The skin to be operated on is rendered anaemic by pressure (because the ~~red~~ corpuscles interfere with the action of the light). The treatment requires a long time because the lupous tissue is exposed little by little to the light rays. The scars, however, are exceptionally fine and in very many cases relapses do not occur. Naturally this method is applicable to skin disease alone, and, on account of the great expense of the apparatus, can be used only in special institutions; but the results are interesting and probably of practical importance.

Gentlemen, as you perceive, the subject of cutaneous tuberculosis is the scene of lively scientific agitations; here as elsewhere the experimental, when associated with the clinical method, attains beautiful and unforeseen results—and here as elsewhere practical and therapeutical results slowly follow upon theoretical advances.

It was the aim of the Tuberculosis Commission to arouse interest in wider circles by a review of the relations of this disease to the integument. It is the general practitioner above all others who must carry the warfare against tuberculosis into the organs where the disease is most readily recognized, namely, the skin. My intention has been to present the armamentarium which is at our disposal for the conflict, and perhaps I have succeeded in inciting many of you to a more thorough study of this interesting and practical field. (1)

REVIEW OF CURRENT LITERATURE.

THE TUBERCULOSIS CONGRESS AT NAPLES.*

The Tuberculosis Congress held at Naples, which opened on April 25th and closed on the 28th, was a great success. The attendance, which numbered about 1,200 persons, included nearly the whole profession of Naples and the surrounding district and many practitioners from Northern and Central Italy. Nearly all European countries were represented, Great Britain, however, being conspicuous by its absence. Among the many tongues in which members of the Congress held converse English was but little heard, and the few who spoke it were almost without exception Americans. The official language of the Congress was of course Italian, but most of the delegates of foreign Governments, including those of Russia, Hungary, Norway and Roumania, as well as the Latin countries, spoke in French.

OPENING OF THE CONGRESS.

The opening meeting was held in the vast theatre of San Carlo, which was tastefully adorned with a profusion of flowers and banners, and illuminated with countless electric lights. Professor Guido Baccelli, Minister of Public Instruction, presided. All the Universities and scientific societies and most of the municipalities of Italy were represented. Among the foreign delegates were the Duke of Ratibor, representing the German Imperial Government; Professors Rudolf Virchow, Rubner, Loeffler, Senator, Gerhardt, Fraenkel and Panwitz, representing Germany; M. Monod, Professor Chantemesse and Dr. Armanigaud, representing the French Government; Professors von Schroetter, Franz Jamoeck, von Fodor and Raisiz, representing Austria-Hungary; Dr. Dubelier, representing Russia; Drs. Heiser and Wilson, representing the United States; Dr. C. M. Cortezo, representing the Spanish Government; Dr. Monteviede, representing the Portuguese Government; Dr. Kallibokas, representing the Greek Government; Dr. Militchevitch, representing Servia; Drs. Ustvedt, Klas, Linvolk and Valler, representing Sweden and Norway; and Drs. Thomescu and Cantacuzeno, representing Roumania. Professor Landouzy represented the Academie de Medecine; Drs. Hochheimer and Schutzen, the Red Cross of Berlin; Professors Ewald and Baginsky, the German Children's Sanatoria Association. The King and Queen of Italy, with the Princes, were present.

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*Taken from British Medical Journal.

(1) For the purposes of this paper, I have cited only a few of the most recent articles. The literature of tuberculosis of the skin may be found in my compilation, published in Lubarsch's und Ostertag's Ergebnisse, I. Jahrgang, IV. Abth., 1896. Touton has given a critical consideration of the more recent articles on the "tuberculides" together with the literature on the subject in Verhand d. deutsch. derm. Gesellsch., VI. Congress, Wien und Leipzig (Etiology and Pathology of Acne, p. 52;) also, J. C. Johnston, the Cutaneous Paratuberculoses, Phil. Mo. Med. Journal, Feb. 1899.

THE PRESIDENT'S ADDRESS.

Professor Baccelli delivered an inaugural address in which, after bidding warm welcome to the foreign visitors, he said that at the present time wherever civilization flourished a holy war against tuberculosis, "that phylloxera of human lives," had been begun. He recalled that Morgagni had first maintained the contagiousness of phthisis against his contemporaries. In Naples and elsewhere the instinct of the people had led them to burn the belongings of those who died of consumption. In the empty anatomo-pathological controversies as to the demonstration of the specific element, in the long period of histological researches extending from Gluge to Lebert, and from him to the Berlin pathologist, as in the fruitless parasitological attempts of Klebs and Toussaint, one sought in vain for a precursor of Robert Koch. The discovery of the tubercle bacillus was one of the most collossal scientific monuments of our time, but it did not in itself furnish anything like a complete solution of the problem. Professor Baccelli reminded his hearers that not long after the date of the discovery he himself had said, "Koch's bacillus is only the histological exponent of tubercle; it is not the whole of tubercle, much less of phthisis." Dealing with the transmission of the disease, he described the sputum as the tuberculous virus par excellence, the materia peccans in optima forma. Another great channel of infection, though affording less ready access than the air passages, was the alimentary canal. To persuade sufferers not to infect others, to teach the healthy not to infect themselves, belonged at once to private and to public hygiene, and was above all an educational problem. Such education was the first among the duties of the state. Men of the less fortunate classes, when smitten with phthisis, finding themselves treated as outcasts, became desperate often to the point of becoming criminals. Those unfortunates must be persuaded that society was anxious to help them and to lessen their sufferings as far as possible. The State, however, should, he held, go further; it should organize this new national defence and support it with the force of law, compelling local authorities and private individuals to use means for the prevention of contagion. It was the duty of the executive to enforce the observance of the rules of prophylaxis on all employed in public administrative services. It must keep watch over the great industries, impose precautions in schools and public offices, and found public stations for isolation and disinfection. Legislation as to cattle was necessary to secure methodical and continuous elimination of diseased beasts. The Italian Government, at the instance of General Pelloux, the Minister of the Interior, had ready a new law for the prophylaxis of all infectious diseases, particularly tuberculosis. Public competition for the construction of sanatoria in suitable places had already been invited by means of prizes. The plans would be on view in Naples in the Exhibition of Hygiene. Passing to the prevalence of tuberculosis, Professor Baccelli said that accurate statistical tables had been prepared which showed incontestably that in Italy the mortality from the disease was less than in any other European country. It had fallen in the decennium from 2,018 to 1,756 per million of inhabitants, and this, although in the number of victims were included many foreigners who had come to Italy to seek relief from its climate. In 1894 the loss of life from tuberculosis in Prussia alone was 71,000, and in Austria 88,000, whilst in Italy, in practically identical demographic conditions, it was only 30,000. This could only be attributed to the climate. It was a matter of common observation, by those much engaged in microscopic work, that at least one-third of the persons who died in Italy there were in the lungs or in the glands cicatrices of extinct tuberculous processes. In Italy there were but few cases of chronic phthisis lasting many years, such as were frequent in northern climes. In Italy, if climatic influences failed to cure, the end generally came within three years. With the means of early diagnosis now available there was in Italy a much larger possibility than elsewhere of successful prophylaxis. Among the ever new and not seldom delusive efforts of specific treatment, faith in the sovereign virtue of climate still remained unshaken; there was no climate more healing than that of Italy, which was therefore eminently suited for the establishment of luxurious international sanatoria. But provisions must also be made for the poor, and funds would be needed not only for the treatment and maintenance of the patient, but for the support of his family; for the treatment of convalescents and for the change of occupation. Professor Baccelli pointed to the example set by England, and now followed in generous rivalry by Austria-Hungary, France, Germany, Switzerland, Russia, Spain and Sweden, and declared that Italy would not lag behind in this noble race. In an eloquent peroration he recalled the visit of the King to Naples in the dark days of cholera, when, prodigal of his life, he warmed within his own the frozen hand of the dying, meriting the name of Father of the People, and said that it was fitting that this latest humanitarian Congress should be held under the august patronage of their beloved Queen.

SCIENTIFIC WORK OF THE CONGRESS.

The Congress then settled down to work. Abstracts of many of the more important papers will be found in the Epitome (British Medical Journal), but a rapid review of the subjects discussed may not be out of place here. Professor De Giovanni, to whose initiative the movement against tuberculosis in Italy is mainly due, pleaded for the systematic treatment of persons predisposed to the disease in special institutions. All children should be examined with the greatest care, so that physical peculiarities suggesting a phthisical tendency might be discovered at the earliest possible moment, and the case appropriately dealt with. He proposed that a committee should be appointed to draw up a scheme of prophylaxis. Dr. Kallibokas (Athens) presented the draft of a law on the subject. Dr. Rossi Doria (Rome) discussed the question of State intervention. He described what had been done against tuberculosis in England by private initiative and in Germany by the intervention of the State; and he concluded by urging the State, if it did not intervene directly, to encourage the struggle. Dr. Pavoni contended that the prophylaxis of tuberculosis in infancy was even more important than that of the adult. He proposed a resolution, which was passed by a large majority, urging the establishment and development of seaside sanatoria and Alpine stations for children. Dr. Sibilla proposed that the state should make notification of tuberculosis compulsory, but Professor De Giovanni insisted that this was not yet within the sphere of practical politics, and said it would be more profitable to seek to do whatever was at present feasible. Santorini pointed out that the Minister of the Interior had already provided for compulsory notification in certain cases. Perossi recommended reform in sanitary and military legislation for the prevention of tubercle in the army. Plechl, speaking of the prophylaxis of tuberculosis from the administrative point of view, recalled the decree of the Kingdom of Naples in 1782 which enjoined isolation of sufferers and disinfection of their effects and places of abode. Afterwards all this was forgotten. He proposed: (1) That medical administrative authorities be instituted in all cities and communes; (2) compulsory notification; (3) the prohibition of the sale of meat from tuberculous cows, even if compensation had to be paid. He insisted also on the need for an active propoganda as to spitting in railway carriages, houses and places of public resort. The prohibition of spitting in railway carriages was also strongly urged by Sanarelli. Ausset (Lille) said that the public authorities should go hand in hand with private initiative in the struggle against tuberculosis. In the matter of spitting much might be done in schools by the teaching of elementary rules of hygiene, and this education should be continued in the army. Sanatoria for the people should be combined with gratuitous dispensaries which might also undertake the disinfection of dwellings. A fund should be established to help the families of tuberculous patients. Anti-tuberculous leagues should be formed in every country to educate the public mind and influence legislation. Ausset pleaded strongly for sanatoria as against general health resorts. Espina y Capo (Madrid) proposed the institution of an international sanitary police to deal with tuberculosis. He urged the prohibition of marriage of tuberculous persons and the enforcement of prophylactic measures in the army. Recruits with any suspicion of tuberculous tendency should be rejected, or they might infect a whole regiment. The age of recruits should not be less than 23, and the chest girth should be raised to 72 centimetres round the nipples. Mennella (Rome) said sanatoria were good for the individual, but of little use to the masses. The greatest social danger of tuberculosis lay in the marriage of tuberculous people. He asked that a resolution might be passed calling on the Government to pass a law forbidding marriage between consumptives. This would be the best means of prevention. Stress was laid by several speakers on the importance of early diagnosis. Maragliano spoke favorably of Koch's tuberculin in latent cases. Landouzy said every individual suffering from tuberculosis should know the truth, and be informed of the nature of the disease, for the sake of the people about him, as well as for his own. The importance of soil in connection with contagion made it imperative at any price to establish a regular system of puericulture or hominiculture in order to render the human family refractory, or, at any rate, to teach it how to defend itself. As a means to this end he recommended the diffusion of instructions as to the right way of rearing children. Medical men should advise the predisposed as to occupation and the choice of a wife. Petruschky insisted on the necessity of making the first symptoms of consumption as widely known as possible, and of doctors learning to "prediagnose" the disease. Tuberculin was one of the surest means for this purpose, and it had the further advantage that cases diagnosed by its help were often cured by the substance itself. Dubelier (St. Petersburg) produced comparative statistics, showing the mortality from phthisis in the Russian and other armies. Marcone dwelt on the great advantages of the tuberculin test in cattle, and insisted on the necessity of supervising the sale of milk from the place of production up to the consumer. From several papers read by Neapolitan practitioners it appeared that Naples was fully alive to the dangers of contamination of the milk supply.

Resolutions were passed as to the enforcement of prophylaxis in public places and in private dwellings; as to the sanitary supervision of the milk supply, and as to the disinfection of railway carriages. Sanatoria occupied a whole sitting. Though no general agreement was come to, the debate tended to a clearness of view on some points. In the words of Bacon, it was luciferum if not directly fructiferum.

One of the most interesting proposals made was that of Professor Queirolo, who submitted the following resolution:

The Tuberculosis Congress of Naples thinks it desirable that a chair for the experimental and clinical study of tuberculosis should be established in one of the largest Universities of Italy.

The resolution was carried by acclamation.

CLOSE OF THE CONGRESS.

The proceedings of the Congress were brought to a close on April 28th. Before the assembly dissolved effect was given to a proposal made by Professor von Schroetter at the Congress held in Paris in 1898, that an international comittee should be appointed to take the initiative in organizing congresses against tuberculosis, with the object of perpetuating an international league against the scourge. The committee appointed consisted of Professors Lannelongue, as representing France; the Duke of Ratibor, as representing Germany; and Professor Baccelli, as representing Italy. Power was given to the Committee to add to its number by the co-option of new members equally for the three countries represented.

Professor Renzi then thanked the members of the Congress for their co-operation, and recalled how the idea of the crusade in Italy had come from Professor De Giovanni. In looking at the imposing spectacle before him he felt compelled to say, "We shall conquer." Professor De Giovanni said it made his heart glad to see his dream of twenty years realized in the Congress, which was a concrete demonstration of a new and higher diplomacy—the diplomacy of science. Professor Lannelongue also said a few words; and in conclusion Professor Bacelli said that fortunately not only tuberculosis was contagious, but charity. As an illustration of this he mentioned that Signor Maury, a member of the Italian Chamber, had resolved to give a historical building belonging to him at Delicato (Foggia), capable of accommodating 200 persons, to make a sanatorium. His Excellency then declared the Congress closed.

THE DIAGNOSIS OF TUBERCULOSIS.

Bozzolo, of Turin, said that in the case of an individual presenting the tuberculous habit of body, one should always suspect the active presence of the bacillus. He emphasized the word "active," because in many cases the microbe might be there as a simple saprophyte. The latent seeds if disease might be quickened into active growth by some infectious disease, by injury, etc. He formulated the following criteria for the early diagnosis of tuberculosis: (1) Intermittent pre-tuberculous albuminuria, often alternating with phosphaturia; (2) tuberculous pseudo-chlorosis, which is distinguished from the true by the fact that there is less lowering of the haemoglobin standard, slighter accentuation of the cardio-vascular phenomena, and by the presence of leucocytosis; (3) disturbances of the digestive apparatus, anorexia alternating with voracious appetite, gastralgia; (4) afrebrile tachy-cardia, characterized by the greatest instability; (5) lowering of the blood pressure; (6) marked and permanent rise of temperature following active movement, and in women elevations of three to four-tenths each day before the oncoming of menstruation; (7) tendency to sweats, not only nocturnal, but also following the slightest fatigue and emotion; (8) a sense of pain in the nuchal and supraorbital region, the upper part of the trunk etc.; (9) inequality of the pupils, and, according to some, dilatation of both; this is rare; (10) appearance of herpes zoster in the area of the distribution of the fifth pair in meningeal, and on the thorax in pulmonary, tuberculosis; (11) the color of the gums—red in those suffering from acute forms, bluish in chronic cases, and white in scrofulous individuals; (12) pretuberculous enlargement of the spleen; (13) amyotrophy of the thorax; (14) dyspnoea, cough, etc.; (15) haemoptysis, when there is no other cause for it, but hysterical suggestion must be guarded against; (16) a sensation of resonance felt by the individual in talking; (17) percussion; this is of little importance, owing to the possibility of asymmetry, or insufficiency of air owing to marked atrophy; (18) auscultation; the bases also must be auscultated; harsh breathing at one apex should not always be taken as an indication of tuberculosis; (19) injections in guineapigs; (20) serum diagnosis after the Arloing-Courmont method; (21) fluoroscopy and radiography, but discount should be allowed for exaggeration; (22) injection of small quantities of physiological serum; this gives a febrile reaction in all grave anaemias, even non-tuberculous; (23) injection of tuberculin; this is the best criterion of all, but, as it may make a chronic process acute, it should be used only when it is absolutely necessary.

DIAGNOSIS OF INCIPIENT FORMS OF PULMONARY TUBERCULSIS.

Senator, of Berlin, said the best criteria for an early diagnosis are as follows: Analysis of the sputum; inoculation of it into animals; reaction to serum and to tuberculin; leucocytosis when it is possible to eliminate all other causes capable of producing it; auscultation and percussion when they reveal changes limited to the apex of the lung; different degrees of expansion of the apices; the artificial catarrh induced by the use of potassium iodide; tuberculous lesions of other organs; previous pleurisies; the habitus pthisicus; cough and sweating.

RELATIONS BETWEEN OBSOLETE TUBERCULOSIS OF THE APEX AND CROUPOUS PNEUMONIA.

Von Schroen, of Naples, in a communication on this subject, said the obsolete focus was an old localization of tuberculosis in which the process had become extinct and the reactive inflammatory phenomena were reduced to the lowest terms, so that the relations between the focus and the neighboring parts seemed to be, and perhaps to an extent were, of the slightest. The most important anatomical features were the following: Slight cicatricial reaction; a slight degree of chronic emphysema; a slight chronic interstitial pneumonia; adhesive pleurisy, either complete or in the form of pseudo-membranes; a caseous residuum usually very small and either simple or calcified; pigmentation and desquamative alveolitis. The author stated that in thirty-five years of post-mortem work he had seen some fifty cases of croupous pneumonia of the apex, and he had been struck by the unusual localization and the generally fatal issue. Death usually occurred on the ninth day, and the lung was found in a condition between grey and red hepatization without having passed into the fourth stage. In all the cases the pneumonic area had been invaded by an enormous quantity of tubercle cells which were endowed with the highest infective and secretive power; besides he had found tubercle bacilli. The author considers the matter important from the point of view of prophylaxis, as it suggests that individuals in whom an obsolete focus exists should use every precaution to avoid pneumonia. In these cases death is not the result of asphyxia caused by the pneumonia, but of the absorption of a large quantity of toxins.

PNEUMOGRAPHIC STUDIES IN TUBERCULOSIS.

Hirtz, of Paris, read a paper in which he said the graphic tracings in respiration in cases of lung disease had hitherto attracted little attention from the profession. The author made a series of researches in cases of tuberculosis with emphysema in 1878, and has more recently carried out investigations on a large scale in persons with healthy lungs and in others suffering from other pulmonary diseases. The tracings must be made in as many cases as possible, and in each individual case a series should be made. The result of his observations went to show that, whilst the tracings of normal respiration consist of four successive lines—namely, one of inspiration; a horizontal line for the period when the lung is full; one of expiration, and a second horizontal line for the period of emptiness. On the other hand, the tracings from the beginning of phthisis show only three lines. The line for the period of emptiness disappears; that of expiration is so much prolonged that it takes the place of the missing line; that of inspiration is sometimes prolonged, but sometimes normal, while the horizontal line of thoracic fulness often persists without a change. This pneumographic formula of chronic pulmonary tuberculosis persists in all stages of the disease, often becoming more characteristic. The author has not met with it in any other pulmonary affection.

INFLUENCE OF CLIMATE ON THE EVOLUTION OF EXPERIMENTAL TUBERCULOSIS

Lannelongue, Archard and Guillard, of Paris, presented a communication on this subject. The influence of climate on the evolution of tuberculosis has not yet been clearly determined. In certain regions the disease is rare, and its relative infrequency is attributable to the mode of life of the inhabitants and the absence of large agglomerations of human beings. The improvement which has been noted in patients who stay at certain health resorts which have a reputation for the cure of phthisis, but which differ widely in climate, is due solely to the effects of the different methods of cure adopted, and cannot be attributed to change of region or place. The authors have studied the question experimentally. They inoculated tuberculosis in equal doses into the pleura in a very large number of guinea-pigs, which they afterwards distributed in places where the climatic conditions were different, everything else being as far as possible the same. In the first experiment, which dates from eleven months back, 150 guinea-pigs (males) were inoculated at the same time, and divided into three lots of fifty. One lot was kept in Paris in the laboratory; a second was sent into the country to Valmont, and the third to Grandes Dalles, at the seaside. The curves of mortality show that those of the country lot was from the beginning the highest, while the other two kept for a long time at the same level; towards December, however, that of the seaside lot went up, the advantage remaining with the animals kept in the laboratory. In a second experiment,made nine months ago, also on 150 guinea-pigs,one lot was kept in the laboratory as before; another was sent to the mountains of the Haute-Loire, at an altitude of 1,000 metres; a third to the woods of the Isle Adam. The last lot was unfortunately partly destroyed by an accident, and cannot, therefore, be taken into account. As regards the other two, the curves of mortality show that the mountain lot was from the beginning slightly below the laboratory lot; then towards October it rose above it, remaining so thenceforward. It is suggested that the relative favorable results observed in the laboratory may be due to the equability of the temperature. Thermometric variations were more marked in the country, and it is during spells of cold that elevations of the mortality curve are seen at the seaside and in the mountains. Some influence may also be attributed to the relative immobility to which the animals in the laboratory were necessarily condemned, this entailing comparatively slight waste. The authors point out that from these reseaches on guinea-pigs no conclusions can be drawn in regard to human beings. The purpose of them has been to place the question of climate on an experimental basis.

TUBERCULOSIS AND MARRIAGE.

Massalongo, of Verona, discussed this subject. His conclusions may be summed up as follows: (1) The inheritance of tubercle is extremely exceptional. What is inherited is the predisposition to tuberculosis. (2) Although contagion is the chief cause of the diffusion of tuberculosis, not all persons living within the sphere of infection contract the disease, but only those predisposed thereto. These in the majority of cases are descended directly or indirectly from consumptives. (3) It is time that the state should resolutely undertake the task of diminishing the disastrous consequences of marriages between persons with a tuberculous family history, and the Church should unite with the State by relieving the faithful from the inflexible ordinance Crescite et multiplicamini. (4) Besides popularizing the knowledge of how phthisis spreads and of how contagion is to be avoided, the people should be instructed (a) as to the most serious dangers of marriage between persons themselves tuberculous or belonging to families in which the disease is hereditary; (b) as to the desirability of not marrying before a certain age; (c) as to the absolute necessity of making sure that the disease is cured, or at least that for two or three years there have been no symptoms, and that there are no tuberculous lesions, for which purpose the advice of a physician should be sought; (d) every precaution should be taken to make a union between persons with tuberculous antecedents childless.

INDIVIDUAL PROPHYLAXIS.

Maglieri expressed the opinion that an acquired proclivity to tuberculosis most often depended on certain pretuberculous diseases, especially those which were generally considered trifling, and for which medical advice was seldom sought, for instance, catarrh of the respiratory mucuous membrane. By way of prophylaxis, therefore, such conditions, whether slight or serious, should be removed as quickly as possible, while the resisting power of the organism should be increased. For this double purpose the author had found sulpho-carburetted hydrogen or sulphate of turpentine most efficacious combined with over-feeding.

MIXED INFECTION IN TUBERCULOSIS.

Sata, of Tokyo, said the variety of forms of tuberculosis depended on the variety of the ętiological factors. Various micro-organisms were found in the sputum, in the lungs, and in the blood of consumptives. The influence of mixed infection on the tuberculous process was very great; the most important symptoms of it were atypical fever, abundant expectoration, extensive pneumonia. The brocho-pneumonia of consumptives was excited by mixed bacteria. The principal micro-organisms of mixed pneumonia were—streptococcus pyogenes, staphylococcus pyogenes, the diploccus of Fraenkel, and the bacillus of influenza. Hectic fever and other symptoms of phthisis were generally produced by other bacteria; the expectoration contained numerous micro-organisms. The mixed infection may in certain cases exert a favorable influence on the tuberculous process. Climatic treatment, hydrotherapy, creosote inhalations have for their object the destruction, not of Koch's bacillus, but of the other micro-organisms.

TUBERCULOSIS AMONG NURSES.

Devoto, of Pavia, presented a communication in which he stated that in the civil hospitals of Genoa there was a mortality from tuberculosis of over 20 per cent. among the male nurses. On the other hand, in one of the hospitals where there are no tuberculous patients the mortality from that cause is practically nil. He, therefore, urged that the greatest care should be taken in hospitals receiving tuberculous patients to protect the nurses from infection. They should not be obliged to sleep or to take their meals in the wards or in immediately adjacent rooms. They should be enjoined to practice rigorous disinfection; they should be frequently inspected and sent for a holiday in the country for a few weeks every year. Where it is not possible to separate tuberculous from other patients, the nurse whose duty it is to clean beds, spittoons, etc., should have nothing to do with giving food, medicines, etc., to the patients.

PROPHYLAXIS OF TUBERCULOSIS ON RAILWAYS.

Sanarelli, after pointing out the dangers of infection in railway carriages, especially on long journeys in waggon-lits, proposed the following resolutions on the subject: (1) It is necessary that the sanitary service should enact and enforce the observance of regulations adequate to guarantee the public against the danger of infective diseases, and especially tuberculosis in railway carriages. (2) Such regulations must include tuberculosis among the diseases for which the disinfection of carriages expressly allotted for the transport of contagious persons is considered compulsory. (3) Railway companies are invited to have put up in all waiting rooms, in the interior of stations, and in all passenger carriages notices intimating to the public that it is forbidden to spit anywehre but in the spittoons. (4) The stations and most of .the compartments of the waggon-lits should be furnished with spittoons containing liquid and easy to clean and to disinfect. In a certain number of these compartments supplied with spittoons smoking should be allowed; in the other compartments without spittoons it should be forbidden under penalty of fine to smoke and to spit on the floors. (5) The railway companies should be called upon to apply an efficient method of ventilation to all carriages intended for the conveyance of passengers. (6) Carpets and rugs of the first and second-classes should be replaced by impermeable coverings of linoleum of indiarubber easy to clean. (7) The wooden floor of the third-class should be smooth and polished and rendered impermeable so that it can be washed every day with the hose. (8) The materials now used for covering the seats and for curtains should be replaced by impermeable fabrics easy to clean with wet sponges, and not holding dust. (9) The construction and internal arrangements of the carriages should be such as to render daily cleansing easy. (10) The old-fashioned system of footwarmers should as soon as possible be replaced by a system of central heating by means of steam.

SURGICAL TUBERCULOSIS.

Ceccherelli, of Parma, dealt with this subject under three heads—infectivity and transmissibility of tuberculosis; in what cases this is more difficult to explain; possibility of cure. The first queston has been settled by the researches of Villemin and Koch. Clinical observation proves that definitive cures may be obtained with much greater facility when aided by appropriate treatment or operation, and the soil, both general and local, in which tuberculosis grows is thus modified. There is no chain between scrofula and tuberculosis, the first link of which is constituted by local inflammation of the superficial parts of the body and the last by the general infection which causes death. Every scrofulous person is a candidate for tuberculosis. Reference was made to the researches of Lannelongue, which absolutely contradicted the relationship between tuberculosis and injury maintained by Schuller, and on this ground it was contended that a cure may be obtained even in cases in which the operator removes nothing, but simply modifies the ground in which the bacillus has implanted itself, making it less suitable for the growth of the micro-organism. In connection with this the author referred to tuberculous peritonitis, of which he was first in Italy to advocate the operative treatment (1887). In dealing with tuberculous foci surgeons often fail because the soil is too well adapted to the growth of the bacillus, but sometimes a lasting cure is possible. The principle which should guide the surgeon might be formulated as follows: Let us fight against scrofula, and we shall have fewer cases of tuberculosis and a larger number of cures.

MUSCULAR TONICITY IN TUBERCULOUS SUBJECTS.

De Renzi and Coop reported that by experiments with the myotonometer of Mosso they found that the muscular tonicity is diminished in tuberculosis more than in any other disease, even nervous. It shows itself from the beginning, even in cases in which the muscular power and nutrition are in good condition. This the authors interpret as signifying that even in the first stages there is an intoxication which acts prejudicially on the organism and the nerve centers.

LESIONS PRODUCED BY THE SPECIFIC POISON OF THE TUBERCLE BACILLUS.

Boccardi, of Naples, gave a summary of his observations which form a part of the work on poison of the tubercle bacillus carried out during the last five years by De Giaxa. In this investigation Boccardi was entrusted with the anatomo-pathological researches on the numerous animals—guinea-pigs, rabbits, dogs, goats, and one horse—used for this purpose. His conclusions are as follows: (1) The virus isolated by De Giaxa, by a process fully described in his book, presents chemical properties which warrants its being counted among the new nucleins. Its action has been tested by means of injections—always in moderate doses—into the subcutaneous cellular tissue, the pleural and peritoneal cavities, the veins and the trachea. (2) Injected into the veins in relatively considerable doses, it causes marked thrombosis, which may extend as far as the right heart, the pulmonary artery and its branches. In such cases the animal dies very quickly by asphyxia. (3) The intravenous injection of smaller doses produces after a time minute capillary thromboses, especially in organs in which the circulation is slower (liver). The animals survive some days and sometimes recover. Post mortem there are found small pulmonary infarcts, sometimes due to embolism in the pulmonary vessels, but more frequently to evident vascular lesions, affecting not only the endothelium—thickening and desquamation—but also of the other coats. The infarcts set up an active process of resorption by means of migrated elements and pulmonary endothelia, which swell, proliferate, and come to form true globuliferous and haemoglobiniferous giant-cells. Where no infarcts are produced, disseminated patches of catarrhal pneumonia are found. In the liver constant and often marked fatty degeneration is met with; less frequently islets of necrotic tissue. In the kidney there is fatty degeneration, but to a much less degree than in the liver. Moreover, there is frequent exfoliation of the glomerular endothelium with necro-biotic changes in the epithelium, especially in the tubuli contorti. (4) Lesions identical in kind if not in degree are met with in the liver, and to a less extent in the kidney when the virus is injected into the subcutaneous cellular tissue of the abdomen, the peritoneum, and the pleura. At the site of injection there are formed largish nodules of leucocytic infiltration. These nodules undergo caseous, more rarely fibrous, transformation. The neighboring glands are more or less considerably swollen. (5) Endotracheal injection of very small quantities produces numerous foci of catarrhal pneumonia; often in the air cells there are giant-cells mingled with the numerous proliferated and migrated elements. In addition, one most frequently finds peribronchial and perivascular nodules which in their histological characters have all the appearance of true tubercles. (6) One may therefore infer that the substance isolated by De Giaxa is the most active, perhaps the specific, virus contained in the bacillus. This idea gains support from the important fact brought to light by De Giaxa—namely, that in the rabbits, goats and horse subjected to the action of the virus, reaction to tuberculin was marked and constant in all the cases.

TUBERCULOSIS OF THE TONSILS.

Labbe and Levi-Sirugue (Gaz. des hopitaux, February 17, 1900,) state that tuberculosis of these organs posesses the genuine characters usually ascribed to scrofulous lymph-ganglia. It is habitually benign, feebly virulent, with a tendency to isolation and latency.

For a long time descriptions of tuberculosis of the tonsils were erroneously included in accounts of pharyngeal phthisis, which is a much more malignant affection. An extensive literature gradually accumulated upon the subject, especially with reference to the tonsils as a point of entry for pulmonary tuberculosis.

A distinction between primary and secondary infection of the tonsil has long been recognized. The secondary type is far more common, and is by no means rare in chronic pulmonary tuberculosis. Numerous statistical tables show that the tonsils are secondarily implicated in at least three-fourths of all cases of chronic pulmonary phthisis; while it is also a very frequent localization in general miliary tuberculosis. In youth the tonsil is much more likely to be spared than in adult life. Thus, in 13 children with tuberculosis, either pulmonary or generalized, only three had deposits in their tonsils. There is no paradox in facts of this sort, because the great frequency of tonsillar implication in adult consumptives is explicable through the agency of the sputum; in childhood the expectoration is usually swallowed, and hence the tonsil is but little exposed.

Primary tonsillar tuberculosis is to be regarded as a rarity. It was probably unrecognized up to 1893, at which period Schlenker reported two cases. Within the next two years Lermoger and Dieulafoy studied the subject exhaustively, making numerous animal experiments. These authors concluded that about once in eight times ordinary hypertrophied tonsils were tuberculous.

Several controversies have taken place in regard to primary tuberculosis of the tonsils. Inoculation tests have been declared invalid because of the readiness with which saprophytic germs could lodge in the anfractuosities of the organ. Again, it has been claimed that the purely histological diagnosis may be invalid, from the fact that giant-cells, etc., may be present in simple inflammation. Some observers fail to find such a condition as primary infection in this locality, all experiments and tests resulting negatively. Upon this background, however, we have a number of well-attested cases. In some of these there is a reciprocal relationship between the tonsils and cervical glands, infection having apparently extended from one to the other in both directions. A consensus of opinion, based upon clinical experience, is that from a primary tonsillar focus the lymph glands of the neck, bronchial glands, vertibrae, middle ear, and perhaps the lungs and meninges may each be infected.

The tonsil may be primarily infected through contaminated air and food, and perhaps by direct conveyance—such as might occur through the use of a laryngoscopic mirror. Experiment animals have been infected by the tonsillar route when fed with tuberculous aliment.

With regard to symptoms, tonsillar tuberculosis usually passes unperceived, whether the infection be primary or secondary. However, we may find it if we look for it—either in adults, with advanced phthisis, or children with extensive cervical lymphoma. In certain cases marked ulceration is present; yet even then we may overlook the tonsillar implication. Direct inspection often discovers an ulcer which had been utterly free from pain or discomfort. The characters of such ulceration are those of tuberculous ulcers in general. Barth has described a painful variety of tonsillar ulcer, which is extremely troublesome. The patient is unable to swallow. This form is rapid in its course, and as a rule the neighboring tissues of the pharynx are also implicated.

It appears that tuberculosis of the tonsils is curable in all stages and in all degrees, through a process of sclerosis. But cases by no means heal as a rule, persisting in statu quo, and being often present at autopsy.

Nonulcerated tonsillar tuberculosis can hardly be diagnosticated. Ulcerated tonsils due to this cause may be confounded with syphilitic chancre and gumma, epithelioma, Vincent's disease, etc., etc. A bacillary or inoculation test may be necessary in order to arrive at a diagnosis.

Not much can be said under the head of treatment. Ulceration may be treated palliatively by orthoform, cocaine, etc., and radically by lactic acid, ignipuncture or the curette.

MAMMARY TUBERCULOSIS.

Morestin (Gaz. des hopitaux, March 1, 1900,) states that this affection was first demonstrated about twenty years ago, and is now one of the best known of all the maladies of the female breast. Within the past four or five years half a dozen monographic studies upon this subject have appeared in France alone.

The present study is based upon two cases observed by the author. One patient, aged thirty, consulted the surgeon for a mammary tumor. She had borne several children, but had nursed only the first born. There was no history of any disease of the breasts. The tumor had appeared six months before consultation, in the right breast. One year before she had had a right-sided pleurisy. There was no change apparent to the eye save a slight retraction of the nipple . A tumor could be felt within the breast, isolated both from the skin and subjacent tissue. Further palpation showed that numerous smaller nodules were also scattered through the substance of the breast. The axillary glands were slightly enlarged. There was no discharge from the galactophorous ducts, but pressure applied to the breast caused pus to flow from the nipple. The main tumor, which fluctuated slightly, was explored with a needle and pus was thereby obtained.

A diagnosis of chronic suppurative mastitis was made. Tuberculosis was suspected, although the case was by no means typical. The breast was extirpated and most of the foci were found to be cheesy and purulent. The patient made an apparently complete recovery, nor was there any sign of implication of any other organ. From the fact that the ducts were involved, it was surmised that the infection was of the ascending type; although the latter form is known to be extremely rare. Examination of the pus revealed the presence of mixed infection by the staphylo-coccus, and there is little doubt that this secondary infection occurred through the openings of the galactophorous ducts. The association of an ordinary pyogenic factor was the cause of the atypical character of the case, for in uncomplicated tuberculosis of the breast we do not commonly find the ducts involved, and the pus escapes by external opening through the skin. On the other hand, retraction of the nipple and axillary adenopathy are classical symptoms in mammary tuberculosis, but the enlargement of the ganglia is usually voluminous, and not, as in the author's case, minimal.

A second example of this disease differed widely from that just described. The patient was a child of fifteen, free from any family or personal history of tuberculosis. The lesion of the breast began one year before consultation and synchronously with the first menses. The initial manifestation, however, was not seated in the breast itself, but in the hollow between the deltoid and pectoral muscles—an ordinary cold abscess, which after discharging and healing, left a keloidal scar. The process had probably originated in a lymph-ganglion, which is known to exist at times in this locality. The next manifestation was axillary adenopathy, the ganglia in this locality enlarging slowly and to a marked extent. One after another softened and discharged externally with formation of fistulous tracts, which finally healed. At this period the breasts began to develop, and a series of nodules began to appear in the outer portion of the (right) mamma. These foci of disease began to soften and suppurate until as many as a dozen fistulous tracts were present. Up to this point the child had received no medical advice. At the first consultation the lower external quadrant of the breast presented the appearance of a sieve by reason of the numerous fistulae, two of which were seated within the areola. Palpation showed that the inner half of the breast was still normal, while the outer or fistulous portion was uniformly hard.

Operative interference consisted of a first stage in which the axillary glands were extirpated, this step proving to be most laborious, although it was possible to spare the neuro-vascular tissues. The incision was then extended to the breast. The surgeon wished to conserve as much of the latter structure as possible. The skin was separated from the subjacent tissues and each fistulous orifice was curetted. The diseased portion of the breast proper was then removed; beneath, some sacrifice of the pectoral muscle was required. After all the infected tissue had been ablated, the resulting cavity was touched with chloride of zinc, and the superjacent structures restored to their original position. Healing took place in a manner almost normal, the only disturbance consisting of a fungating tendency on the part of the drainage opening in the axilla. As far as the breast proper was concerned the cure appeared to be complete and permanent, although there was some tendency to a recrudescence of the axillary disease.

This case appears to show that the usual order of infection may be reversed, and that exceptionally the breast is infected by continuity or contiguity from glandular tuberculosis. This opens up a wide field of surmise with regard to retrograde propagation of germs along the lymph channels.

TUBERCULOSIS OF THE STOMACH.

Simmonds (Muench. med. Wochen., March 6, 1900,) begins a short study of this subject by a reference to two cases of alleged primary tuberculous ulcer of the stomach reported by Petruschky at the last Congress fuer innere Medicin at Carlsbad. By means of the tuberculin reaction, cases of chronic affections of the stomach were shown to be of tuberculous origin, while the therapeutic employment of the same substance appeared to bring about a cure in one case and improvement in the other. The same author has seen numerous other cases of gastric affection which he believes might have been brought into the same pathological category.

That tuberculous affections of the stomach occur with any degree of frequency, as Petruschky seems to imply, is an opinion which is nullified by the teachings of pathological anatomy. Ordinarily many hundred sections can be made without once encountering any tuberculous ulcer whatever within the stomach. The secondary localization of the disease in the gastric mucosa is of such infrequent occurrence that Simmonds has found it but eight times in 2,000 autopsies; and as for a primary localization the eye of no pathologist has yet beheld one.

The striking resistance offered by the gastric mucosa to this sort of infection is the more remarkable when we bear in mind the readiness with which the intestine succumbs to the same process. We know that the gastric juice does not destroy the bacilli, even after long exposure. Whether this is true of pathologically altered gastric juice can only be determined after studying the latter fluid when tuberculous ulcers are present in the stomach.

The author now presents a case which appears to bear out the view that tuberculous ulcers occur more readily in a stomach the natural secretion of which is altered. The patient, a man, aged forty, died of pulmonary and intestinal tuberculosis. Near the pylorus occurred a small, firm, carcinomatous nodule which had produced a considerable narrowing of the lumen of the stomach, the organ in general being much dilated. Scattered over the gastric mucosa appeared numerous small tuberculous ulcers. The presumption is that the alteration in the secretions, especially in regard to the diminution in the amounts of hydrochloric acid, had favored the infection of the stomach by the bacillus. Such an association as cancer and tuberculosis, occurring in the stomach, is very surprising.

Simmonds also showed to the Congress other cases of his collection of tuberculous gastric ulcer. The patients had succumbed to pulmonary and intestinal tuberculosis. These lesions of the stomach were single or multiple, very small or of any size up to a dime, seated usually in the pyloric portion, round in shape, and in character resembling the familiar tuberculous ulcer of the intestine. Simmonds has never seen either perforation or the arrosion of a large vessel follow, but he has observed, as a result of extension of the process, a great ulceration, measuring no less than 10 cm. x 20 cm. The diagnosis was only made after prolonged histological investigation.

In all the author's cases, including the last named, symptoms referable to the stomach had not been in evidence during the patient's life. In the case in which the stomach was so extensively ulcerated the patient was first under treatment for fistula in ano. He also had sooner or later symptoms referable to the lungs, pleura and intestines, but never any evidences of gastric implication. It, therefore, appears that gastric tuberculosis is one of those affections which cannot be diagnosticated intra vitam.

It must not be forgotten that ordinary simple round gastric ulcer may complicate phthisis; and that in such cases—the author has recently seen two examples—the stomachic symptoms are very much in evidence. In the cases referred to, hematemesis and cardialgia were present to a market extent. As this association of phthisis and simple round ulcer is not rare, we must bear in mind as a fundamental principle in diagnosis that when severe gastric symptoms supervene in a consumptive, we may suspect the presence of a simple, but not of a tuberculous, ulcus ventriculi. To use the tuberculin reaction under such circumstances would seem to be entirely superfluous, for primary tuberculous ulcer of the stomach is not yet a pathological entity.

Before leaving this subject, it will be well to state that there is a form of tuberculosis of the gastric wall which so far from being rare is of frequent occurrence. This affection is hematogenous miliary tuberculosis, a condition not recognizable by the naked eye. This condition presupposes a chronic general tuberculosis. Notwithstanding its frequency, it was first fully described in 1898 by Welms. The tubercles occur in the substance of the mucosa, and most of the cases described have been in children. During the past year Simmonds has encountered four cases of this sort, and was able to detect the tubercles in the muscular coat of the stomach. As it has long been known that the serous layer of the stomach is readily implicated in hematogenous miliary tuberculosis (in company with other serosae), we are, therefore, able to state that the entire thickness of the stomach wall may participate in this type of tuberculous infection. Clinically, this latter manifestation of disease has no status, because the patient succumbs long before the tubercle could become confluent and cause destructive leisons.

PRIMARY TUBERCULOSIS OF THE SPLEEN.

Bender has contributed an exhaustive article upon the subject of splenic tuberculosis for the Gaz. des hopitaux, March 31, 1900. He has the following to say concerning primary infection of the organ in question:

Quenn and Baudet were the first to describe the primary localization, with an account of five cases, one of which was a personal observation. About as many more have been reported since the publication of this pioneer study. A survey of this material appears to show that there are two types of primary disease, to be distinguished as acute and chronic, although the former is represented only by a solitary case, that of Scharoldt. The patient was a man of twenty-five years of age, whose disease supervened suddenly, a violent chill having been followed by high fever and profuse sweats. Great weakness soon became apparent, and intense headache was a leading symptom. Physical examination revealed the presence of a greatly enlarged spleen, but otherwise results were mostly negative. There was no localized pain or tenderness. The circulatory disturbances in the head were further manifested by cyanosis, epistaxis and delirium. Patient died in a state of typhoid exhaustion on the seventeenth day after admission. Autopsy revealed a greatly enlarged spleen full of disseminated miliary tubercles. There were absolutely no other granulations elsewhere in the body. This case then appears to have been an example of acute miliary tuberculosis of the ordinary type, but limited to the spleen.

Chronic primary tuberculosis of the spleen has thus far been almost entirely confined to the third and fourth decennial periods of life. Autopsies reveal two pathological types, viz: the sclero-caseous and haemorrhagico-necrotic. The former is considerably more frequent than the latter, and is characterized by a sclerotic induration of the organ with areas of caseation. The tumefaction of the spleen has usually been very great. The haemorrhagico-necrotic form has thus far been represented by a single case, that of Achard and Castaigne. The spleen of this patient was greatly enlarged; there was no evidence of sclerosis; and the organ was strewn with numerous foci of hemorrhage, consisting purely of unorganized fibrin. A few of Koch's bacilli were discovered in these foci.

An analysis of cases with regard to the behavior of the peritoneum shows that the latter may remain unaffected; or become the seat of simple localized inflammation, with production of ascites or adhesions; finally it may present tuberculous granulations from outward extension of the process beneath.

The neighboring lymph-ganglia of the hilus naturally participate. While the majority of these cases were not subjected to surgical intervention. Hayden performed a splenectomy for primary tuberculosis in 1898, while a year earlier Bland Sutton operated upon a patient with the same affection, but the case has not yet been reported.

TUBERCULOSIS OF THE UTERUS.

Michaelis (Hegar's Beitraege zur Geburtshilfe und Gynaekologie, 1900, III, Heft 1,) speaks of the ever increasing importance of this subject; and after a brief historical resume—in which the various advances in our knowledge of cervical tuberculosis are especially noted—proceeds to report a case of localization of the disease in the portio vanginalis which was at first diagnosticated as a papillary cancroid. After first ablating the tumor proper with the Paquelin, the entire uterus was removed per vaginam. Although ovaries and tubes were fixed by adhesions, they were left in situ on account of patient's youth.

The uterus was subjected to a careful study. The mucosa of the corpus appeared quite normal to the naked eye. The lining of the cervix, however, together with the os externum, was studded with papillary irregularities which completely filled the latter and projecting into the vagina for the space of 1 cm., presented the appearance of a cauliflower-like neoplasm. The normal pavement epithelium of the portio vaginalis was for a certain area replaced by tuberculous granulation-tissue. The glands of the cervix had undergone proliferation and metaplasia, so that they represented a solid mass of epithelioid cells invested by a wall of leucocytes. Traced upwards into the uterus the process appeared to terminate gradually at the internal os. The epithelial metaplasia much resembled that which accompanies carcinoma. A chronic muco-purulent catarrh was associated with the affection of the cervix, due, according to the author, to the original penetration of the bacilli through the mucosa. The process in toto consisted in the substitution of tuberculous granulation-tissue for the mucosa, glands and interglandular tissue. Caseation was nowhere found.

This type of disease agrees entirely with that described by von Franque, Orthmann and Alterthum, which also affects the corpus uteri in some cases. The individual case corresponds to Kaufmann's extremely rare example of "primary isolated cervical tuberculosis." Michaelis's patient continues in perfect health three and a half years after the date of the operation, thereby indicating the primary and localized character of the affection.

A second case described by the author was an example of another very rare condition—a tuberculous uterine polypus. This growth projected into the vagina and was of the size of a chestnut. It was removed for an ordinary mucous polyp, but investigation showed numerous tubercle and giant-cells in its interior, while Koch's bacilli were also present in great numbers. After removing the polyp the uterus was curetted and examination of the scrapings also revealed evidences of tuberculosis. On account of the patient's general condition, and evidences of probable pulmonary and peritoneal tuberculosis, this case was deemed to be an example of ordinary descending uterine tuberculosis, infection having been propagated from the peritoneum along the tubes and so to the cavum uteri.

Similar cases of tuberculous polyp have been reported by Zahn and Madlener.

A third personal case related by the author was likewise an example of descending uterine tuberculosis; the cervix appeared to bear the brunt of the infection, being greatly thickened and covered with individual ulcers.

It appears possible to cure a uterine tuberculosis by early curettage, but this interference is only palliative unless the specific lesions are all under full control, so that any progress of the disease can be immediately met by radical operation.

SPLENIC-MYELOGENOUS LEUKAEMIA WITH PULMONARY TUBERCULOSIS—REPORT OF CASE.

Drs. Henry L. Elsner and William A. Groat report a case of splenic-myelogenous leukaemia with pulmonary tuberculosis. The writers review the literature, and give a full bibliography showing that the association of pulmonary tuberculosis with any form of leukaemia is exceedingly rare.

There are a few cases on record of lymphatic leukaemia complicated with tuberculosis. A thorough study of the cases which were supposed to have been of the splenic-meylogenous variety show that there are only two, and one of these may be considered to be of the splenic lymphatic myelogenous variey with tuberculosis.

The case reported is probably the first of splenic-myelogenous leukaemia with pulmonary tuberculosis in which the diagnosis has been confirmed by a differential count of the leucocytes and the demonstration of tubercle bacilli in the sputum.

The patient who was referred to Dr. Elsner for diagnosis was a baker forty years old; his family history showed a strong tuberculous taint. His present illness began a number of months before the advent of continuous symptoms, when the patient complained of great fulness in the abdomen and progressive increase in its size. He became depressed, and his general condition was also below par. In the spring of 1899 all of his symptoms increased, and he grew progressively weaker. His color changed and became characteristic of leukaemia. In November, 1899, he commenced to cough, and had all of the symptoms of progressive pulmonary tuberculosis. Tubercle bacilli were found in the sputum; the sputum was also blood-streaked. The patient lost weight progressively, the temperature was usually slightly above normal, averaging from 100° to 102° F., the pulse was uniformly accelerated.

Physical examination failed to show involvement of the lymphatics, the spleen almost filled the abdomen, the liver was also enlarged, the lungs showed positive physical signs of infiltrating tubercles, disorganization, and cavity formation.

The blood examination was characteristic of splenic-myelogenous leukaemia. The red corpuscles varied from 3,320,000 to 2,922,000. The different counts show an enormous percentage of myelocytes. The average of these is 26 per cent. At one time the writers found 38 per cent. There was a marked relative reduction in the number of lymphocytes, which vary in the counts from 4.1 per cent. to 7.5 per cent. The eosinophiles are increased. Many of these are myelocytes and dwarf cells. There were large numbers of normoblasts, or nucleated red corpuscles. The highest count of leucocytes was 320,000; lowest 121,500.

The writers found a gradual and steady decrease in the total number of leucocytes, but an increase in the percentage of polymorpho-nuclear neutrophiles, a decrease in the number of myelocyts, and an increase in the number of lymphocytes as the tuberculous process advanced. The blood at all times retained the characteristics of splenic-myelogenous leukaemia.

The paper contains besides a full table tabulating the results of many blood counts, diagrams which show the physical signs, and water colors reproducing the picture of the blood as it was found on microscopic examination.

The writers dilate on the interesting changes found in the blood of leukaemia with added tuberculosis, and also consider the literature of this subject as well as the effect generally of added infection on leukaemic blood.

The urine showed a marked increase in the excretion of uric acid.

The changes found in the lung in leukaemia are considered in connection with a study of the literature of the subject.

The case reported demostrates very clearly the effect which the added tuberculous infection probably had upon the blood, reducing materially the number of leucocytes.

The physical signs with associated laryngeal tuberculosis, the enlargement of the liver and spleen, the presence of tubercle bacilli in the sputum, and the changes in the cellular elements of the blood with the convincing differential counts makes the diagnosis of splenic-myelogenous leukaemia with pulmonary tuberculosis positive. Auto-ref.

ASSOCIATION OF TUBERCULOSIS WITH CANCER.

Claude, in a small monograph which is one of the series known as Les Actualites Medicales (Paris, Bailliere, 1900,) discusses the co-existence of these affections in the same individual from every point of view.

Our modern knowledge of this association of disease may perhaps be said to date from the publication of a very thorough paper by Picot in 1879, describing a case in which a cancer of the liver was found side by side with advanced pulmonary tuberculosis. Cases reported by the older pathologists, such as Cruveilhier's association of both processes in a testicular tumor, are perhaps open to doubt from incompleteness of descriptions. However, there is one hybrid form which has been well known to the profession since the fifties, to wit, the grafting of epithelioma upon lupus. Under these circumstances the lupus may be in active growth or may have undergone cicatrization. It is a question whether some cases of this alleged double infection are not simply instances of lupus alone in some atypical form. One author, Schutz, claimed that all cases of "lupus-carcinoma" were nothing but pure lupus, but his arguments in support of this claim are far fetched. Laryngologists have recognized the same hybrid form of disease in the larynx, oesophagus, etc.

Of late years, the conjunction of pulmonary phthisis with cancer of the lungs has been reported by several authors. There is a general agreement that the tuberculous disease antedated the cancer, and in fact seemed to pave the way for the secondary infection.

Warthin, an American surgeon, has quite recently reported the coexistence of carcinoma and tuberculosis in the mammary gland, the last named disease having been the primary affection. In a second case, given by the same author, this order appeared to be reversed, the tuberculous process having been grafted upon the carcinoma.

After these introductory remarks, Claude begins a systematic presentation of the subject as follows: The most exhaustive treatment of the subject of cancero-tuberculous symbiosis is given by Lubarsch, who has examined the autopsy records in Breslau from 1875 to 1887. Out of a total of 6,536 autopsies there were noted 2,668 instances of tuberculosis and 569 cases of cancer; of the tuberculosis cases 117 (4.4 per cent.) were also cancerous, while of the carcinomatous patients 117 (20.6 per cent.) were also tuberculous. Other pathologists have confirmed Lubarsch's results. The last named author analyzed his material with the consequence that he thereby isolates five different kinds of association.

1. Purely accidental association of the two diseases (over one-half of all cases). Here are found cancer in one locality and tuberculosis in another.
2. Metastasis of a cancer developing in a tuberculous focus—a tolerable frequent variety.
3. Secondary infection of a carcinoma by Koch's bacillus—only three cases in Zubarsch's material.
4. Carcinoma developing upon a chronic progressive tuberculosis. The latter affection simply predisposes to cancer as a trauma might.
5. Simultaneous development of the two processes. No authentic case on record.

In this connection attention is called to the fact that sarcoma of the lung can very closely imitate tuberculosis (disseminated nodules, cavity formation, etc.). Tuberculosis has been found combined with glioma in the brain, and with endothelioma in the submaxillary region. Clement, who reported the last named case, has also described an instance of cancer of the lower jaw in which the cervical glands were tuberculous. Here the proximity of the cancer appears to have aroused the dormant glandular disease. Tuberculosis of the axillary glands has similarly followed the appearance of carcinoma of the breast.

There is evidence that in certain cases of cancer of the stomach Koch's bacillus has been enabled to enter the lymphatics through the ulcerated gastric wall and cause tuberculosis of the intestinal glands and certain viscera.

There are many cases on record in which tuberculous adenitis appears to have passed into malignant lymphoma. The following instances may be cited as a type: A boy aged fifteen had enlarged glands in the left lateral cervical region since early childhood. After extirpation a recurrence took place to such an extent that only a portion of the ganglia could be safely removed. The patient perished of generalized lympho-sarcoma. Ricker, who reported this case, held that the tubercle bacillus was the sole cause of the generalized glandular infection, and a number of similar cases on record seem to bear out this conclusion.

It has been established beyond a doubt (although but a few cases are upon record) that Koch's bacillus may penetrate into the structure of a cancer in active growth and give rise to all the phenomena of tuberculosis (caseation, giant-cells, etc.) at the expense of the cancerous tissue

Claude terminates his study with a short section upon the general pathogenic relationship of cancer and tuberculosis. The great number of cases cited by him will serve to entirely explode the traditional belief that there is an antagonism between the two diseases. There is abundant evidence that cancer does not present an unfavorable soil for the development of secondary infections and that tuberculosis is but one of a number of microbian diseases which may be grafted there upon.

INHERITANCE OF THE LOCUS MINORIS RESISTENTIAE IN TUBERCULOSIS.

Turban (Zeitschrift fuer Tuberkulose und Heilstaettenwesen, March, 1900,) after stating that we have but little actual knowledge in regard to the inheritance of consumption, declares that we may be certain that hereditary influence when present does not modify the course of the disease (contrary to ancient beliefs upon this point). Now that we know more about the universality of tuberculosis and its many ways of propagation, many authorities are becoming skeptical as to the existence of hereditary transmission.

Koch, who solved the problem of acquired transmission, was, as far back as 1883, an advocate of the existence of an inherited disposition or habitus. The weak points in this doctrine have always been the presence of numerous cases in which the so-called phthisical habitus has not been handed down to the descendants of him or her thus afflicted, and the fact that the physical peculiarities in question do not manifest themselves until about the time of puberty.

Turban, who is a sanitarium physician at Davos, has conducted a series of observations to determine whether or not regions of weaker resistance toward tuberculous infection appear to be present in parents and their children alike. He begins by stating that he has often noted that parent and child or brother and sister are first attacked in the same side of the chest. For the past eight years he has recorded observations upon this particular. Naturally he has often been compelled to accept the judgment of physicians at a distance with regard to these localizations. The patients were invariably of the better classes. Data relating to 121 individuals, representing 55 families, were obtained, and they are divided into two classes, which relate respectively to parents and children and brothers and sisters. In one family, for example, the father was affected with phthisis of the right upper lobe and the four year old son developed pneumonia, probably tuberculous, in the same locality. A second father had right apical tuberculosis, while a female infant, aged but three months, was affected with right-sided broncho-pneumonia. A mother who showed incipient phthisis of the entire left lung had a ten year old daughter with a similar affection, having the same localization. Turban cites 22 pairs of cases like the proceeding, and in all but three there was a correlation in the site of the lesions. If we include cases in which more than one child of the same parents was infected, the percentage of correlation amounts to nearly 90 per cent. Similar results were obtained from a study of brothers and sisters.

DIAGNOSTIC AND THERAPIC SIGNIFICANCE OF TUBERCLE BACILLI AND OTHER MICRO-ORGANISMS IN THE SPUTUM

Brieger (Berl. klin. Wochensch., March 26, 1900) states that the tuberculin test is almost too sensitive as a diagnostic reagent. Demonstration of bacilli in the sputum is a coarser test which, however, is susceptible of methodical interpretation according to the exact character of the findings. Thus if we have a case of phthisis in the earlier stages everything depends on getting sputum directly from the lung tissue. The patient should clear the throat directly upon waking in the morning. The sputum should be first stained with carbol-fuchsin, and then decolorized with nitric acid. Methylene-blue is used as a counter stain. Comparative tests have shown that the above process gives results superior to all others.

If no bacilli are demonstrable by this method, the 24-hour amount should be collected and Biedert's method of sedimentation should be resorted to (boiling with 1 or 2 per cent. of soda-lye). If this procedure fails, we should make use of the same principle in examining the feces, since many patients, adults as well as children, expectorate but little, the sputum being swallowed. If this test is employed methodically the investigator will on certain occasions be greatly surprised at beholding innumerable tubercle bacilli in the sputum—this, too, without the presence of intestinal tuberculosis. With regard to the significance of particular findings, the persistent occurrence of bacilli in abundance indicates the presence of cavities. Clumps of granular bacilli indicate a tendency to breaking-down of tissue. Alternation of findings, with few and many bacilli respectively, signifies the occasional opening of closed cavities and discharge of their contents. Neufeld and the author have recently shown that in beginning and even in advanced tuberculosis months may elapse during which period the most careful investigation fails to reveal the presence of a single bacillus.

With regard to the so-called pseudo-tubercle bacillus which has been found in the sputum by several investigators, this germ has recently been shown by Rabinowitch and Kempner to be associated invariably with pulmonary gangrene.

The subject of mixed infection has recently been studied with great care by Sata, and we are now more than ever convinced as to the great influence of this element upon prognosis. Pure local tuberculosis is almost afebrile, and the sputum is slight in quantity. Mixture of infection manifests its advent by a great increase in the amount of expectoration. The mixed infection very often manifests itself as a pneumonia with lobar or lobular foci, in which the tubercle bacilli are found associated with either staphylo-, strepto- or pneumo-cocci. These micro-organisms are often to be met with in the sputum, alone or in association. The dreaded hectic fever and night sweats are doubtless the work of the strepto-coccus, and the author has recognized (in harmony with Petruschky) the so-called "strepto-coccus curve" in the fever charts of many consumptives. Pulmonary phthisis is therefore in part a "chronic sepsis."

The staphylo-coccus pyogenes, from its known liquefying action on the connective tissues, must necessarily play an important part in causing the breaking down of pulmonary tissue as the disease progresses. These associated forms of bacteria are particularly dangerous in connection with the production of aspiration pneumonia. Even when patients have apparently recovered their health, this accident may, according to Baeumler, be precipitated by a haemorrhage, the bacilli being thereby disseminated through portions of the lungs.

The frequent coincidence of the tubercle bacillus and Pfeiffer's influenza bacillus in the sputum is a noteworthy fact. The latter germ may rapidly invade sound portions of a phthisical lung, death being thereby quickly brought about. On the other hand, this same influenza germ may vegetate for long periods in tuberculous cavities as a harmless saprophyte, which may at any moment become virulent, not only to the bearer, but to other phthisical subjects who may inhale it. Other forms of mixed infection which may influence the prognosis unfavorably, are those in which the bacillus pyocyaneus and the micro-coccus tetragenes are asssociated with the tubercle bacillus.

It is therefore readily apparent that a specific remedy like tuberculin cannot meet the indications furnished by mixed infection, while it may still be rationally employed in cases where mixed infection may be excluded.

If the stomach is a consumptive's best friend, it is equally true that the mouth may be his worst enemy. For it is evident that a badly kept mouth may serve as a nidus for the development of strepto-cocci and other germs. Rational treatment of the buccal cavity is our best prophylactic resource against mixed infection. With regard to treatment, antiseptics, such as creosote, aromatic oils, etc., while ineffective against the principal factor, may have some power over the associated elements. As pulmonary phthisis is a matter of associated infection of pulmonary tuberculosis, it is the former condition not less than the latter which we must seek to prevent and cure.

ELEMENTS OF THE EARLY DIAGNOSIS OF TUBERCULOSIS.

Landouzy read a paper with the above title at the Naples Congress. From the report furnished to La Presse Medicale for May 2, the gist of his treatment of the subject is as follows:

He speaks of the elements of "presumption, suspicion, probability and certainty" in connection with the diagnosis of incipient phthisis. A "suspect" has a right to know the truth, in order that he may safe-guard himself.

With regard to the disposition to consumption, the science of puericulture must take cognisance of the problem of scientific antagonism towards its assertion. All the machinery of modern sanitary science should be enforced, whether the bearing is direct or indirect—compulsory notification, sanatoria, organized charity for the families of the tuberculous, alcoholism denounced as "making the bed" for tuberculosis, and many other prophylactic factors of the same nature. In countries with compulsory military system, the army physician has many chances to detect early tuberculosis, especially in connection with the examination of recruits. The family physician has abundant opportunities to detect suspects and incidentally to forbid unwise marriages.

At the same Congress Professor de Giovanni read a paper on the factors which predispose to tuberculosis. The newborn, he states, preserves for a considerable period his embryological morphology; but soon individuality is asserted, and at the time of the second dentition is considerably intensified. We may now be able to make out the predisposition to various affections. With regard to early childhood, those who are defective in vitality appear to have either a hyper-activity or a hypo-activity of nutrition. In the first class the circulation is overactive, and the children appear to possess the most robust health. The heart is large and well formed. In the medium type, the heart is small, the nutrition is only fair, there may be a little lymphatism. In the third type, the reverse of the first, the heart is abnormal; the right ventricle is better developed than the left; the veins and lymphathics are overdeveloped, while there is hypo-plasia of the arteries. Some of these children are plump, but there is a marked disposition to catarrhal and eczematous troubles. The children become tall and thin, suffer from intestinal troubles, and are prone to present in after years classical pictures of scrofula and tuberculosis.

When a child reaches the age of ten years we should be able to pronounce as to whether or not tuberculosis is foreshadowed. We should examine the skeleton, circulatory apparatus, nervous system.

The bones are long and thin with irregularities of ossification here and there; the reach of the out-stretched arms exceeds the body-height. The thorax is too small for the needs of the organism. The heart is small, asymmetric; the arterial system insufficient; the veins exuberant—this disproportion causes a slowness in the circulation.

This type, however, is not immutable. We see children whose health and organization have been perfect, develop curved spines, and flat chests at puberty; while children with stigmata of the tuberculous predisposition may develop into the possession of large chests, respiratory capacity and musculature. This great disparity appears to be due in some way to the nervous system or that part of it which presides over trophic changes. In other words, the innervation is an all-important factor in these cases.

Children ought to be examined for these evidences of the tuberculous predisposition, and the great national movements for eradicating tuberculosis ought to take cognizance of some plan for furnishing these children with gymnastic training. Such a movement would be of advantage fully equal to that which will accrue from the crusade against the bacillus.

Papillon considers the reaction of the nervous system to the toxins of tuberculosis as an aid to early diagnosis. The reaction produced by tuberculin, he characterizes as too promiscuously present—in the cancerous, the syphilitic, the leper, or even an ordinary cachectic, we may get the reaction at times. It is valuable when applied to cattle, because it enables us to reject the weak, whether tuberculous or not. In the same way it may be valuable in man. Every organ which reacts to tuberculin is under the domain of the sympathetic nervous system. It therefore comes about, he believes, that through the sympathetic, the organ of least resistance, is the one which partakes in the reaction. If a neurasthenic, the patient who is tested with tuberculin, or who is undergoing the evolution of the disease itself, exhibits in the latter case pretuberculous neurasthenia, and, in the former, the nervous system suffers in the reaction to tuberculosis. It makes no difference, according to Papillon, whether the tuberculin is artificially injected or absorbed from deposits of tubercle. He concludes, therefore, that if this substance is injected into any one with an irritable sympathetic nervous system, we may have the reaction, and there can be nothing specified about it.

ON THE CURABILITY OF TUBERCULOSIS.

Professor v. Schroetter, of Vienna, in the first number of the new Zeitschrift fuer Tuberkulose und Heilstaettenwesen (March, 1900,) gives a further contribution to this subject upon which he had already expressed himself briefly at the recent Berlin Congress. He says that there is an ever-increasing confidence in the curability of phthisis under climatic—hygienic—dietetic management, while at the same time a search for new drugs, capable of exerting both a general and local action upon the disease, is being prosecuted with ever increasing vigor. He then proceeded to discuss the question of efficient sanatoria from a local standpoint, and speaks of the advantage of having both summer and winter stations in order to derive all possible benefit from climate;—citing the opinions of Huchard in regard to this latter subject (stations climatiques et sanitoria par H. Huchard, Journal des practiciens, No. 21, 1899).

Returning to his theme, "curability," the author now cites a personal case as follows:

A young woman of tuberculous stock (mother and sister had died of phthisis) had exhibited evidences of infection for the previous six months. Consulting the throat clinic for hoarseness, she was found by von Schroetter to have laryngeal phthisis with beginning pulmonary implication (right apex). No fever present. Larynx treated with lactic acid and resorcin (one per cent.) inhalations. After temporary improvement she returned, over a year later, with evidences of somewhat advanced pulmonary mischief (both apices involved); the larynx was also in a worse state. The Alland sanatorium was at that time ready for patients, and von Schroetter sent the woman thither, although with no hope whatever of seeing improvement in her condition. Having occasion to visit the sanatorium three weeks after the patient's admission, he was surprised to learn that she had gained nine pounds, and that the laryngeal lesions had especially improved, the ulcers having healed under 80 per cent. lactic acid applications. By December (patient had entered the sanitorium on the previous July), both the laryngeal and pulmonary lesions had undergone complete resolution. Some stenosis of the glottis remained to indicate the severity of the affection from which the patient had recovered.

This case apears to have impressed the author as a startling instance of recovery from a pernicious local disease, to say nothing of the arrest of well-developed pulmonary mischief; but he was not yet prepared to view such a result as permanent. Three weeks later the patient returned for treatment of her laryngeal stenosis. The cicatrix had to be divided, and it was also evident that a new granulomatous deposit had occurred in the larynx. This lesion was curetted, and once more the larynx appeared to be sound. The next step was a return of the lung disease, and the patient was sent back to the sanatorium. After temporary benefit a tuberculous diarrhoea set in (bacilli in stools). This apparently sealed the fate of the patient, and all local lesions became worse with a rapid decline in the general condition. Death occurred about a year after the date of her discharge from the institution as cured.

The lesson of this case is of course obvious. Perhaps the patient ought never to have left the Alland sanatorium. von Schroetter is not quite sure that this course would have saved her, but he is certain that remarkable improvement may be obtained under hygienic management in cases where mere drugs aided by the vis medicatrix naturae are wholly insufficient to stay the progress of tuberculosis.

TREATMENT OF TUBERCULOSIS IN THE NINETEENTH CENTURY.

Baeumler gives a historical resume of this subject (Berlin. klin. Wochenschrift, April 2, 1900,). Cod-liver oil was introduced in 1824, while iodine, discovered in 1811, soon found its way into therapy. Before the employment of these substances, the treatment of tuberculosis had been purely antiphlogistic (vensection, derivatives of all sorts, purgatives, emetics, etc., etc.). Peruvian bark and its alkaloids were also recognized as of great benefit in phthisical affections. There were scattered champions of fresh air, sun-light, travel and passive exercise for both scrofula and tubercle in the early decades of the nineteenth as well as in previous centuries.

The doctrine, first introduced by Buhl and Niemeyer, that the circumscribed caseous focus was the primative lesion which might at any time precipitate a disseminate miliary secondary infection called forth a tendency to extirpate all such foci, in glands, bones and joints. With the introduction of antisepsis and asepsis, and especially after the discovery of iodoform, this type of surgical intervention became much more conservative, while the range was extended to nearly every region of the body.

Along in the sixties cumulative statistics began to show that the mortality of tuberculosis underwent a notable decline under general sanitary measures. Brehmer, influenced by Rokitansky's demonstration of the weak heart and defective circulation of the candidate for tuberculosis—began about this time to inaugurate his hygienic-climatic regimen (1859). The culmination of the movement thus began at the close of the century is too well known to be here discussed. Suffice it to say that Brehmer's ideas are being systematically propogated and executed throughout all the cultured countries, not only by individuals and societies, but by governments themselves.

The hygienic treatment of tuberculosis is, however, an empirical make-shift. With the discovery of Koch's bacillus a search was begun for a rational specific. Thus far, we know that tuberculin is indirectly a most valuable prophylactic, enabling us as it does to detect the presence of the disease in cattle and condemn the bearers of infection. As a remedy, tuberculin is still under investigation.

The doctrine of phagocytosis has led to the employment of remedies calculated to cause hyperleucocytosis (cantharidin, cinnamic acid). This phase of treatment is also in the experimental stage.

Baeumler also briefly mentions the introduction of creosote and other antiseptics, of nutrient preparations, symptomatic remedies, etc., etc., and he states in conclusion that all of the great advances in phthisiology, none is more important than the thorough recognition of the individual predisposition to the disease.

DAILY ROUTINE OF CONSUMPTIVES.

Courtois-Suffit (Gaz. des hopitaux, February 20, 1900) gives the daily regimen to be pursued in the following classes of tuberculous patients:

1. Recent afebrile cases: Occupation abandoned. Rise at 8:30. At 9 a. m. eat an egg with bread and butter, and perhaps a bit of cold meat. Tea, coffee or chocolate. Saunter about from 10 to 11:30. Rest half an hour before meals. At noon eat four to eight ounces of rare meat or an equivalent of meat extract. Rest in the open air until 4:30 p. m. From 5 to 6 p. m. walk or drive. Take temperature between 4:30 and 6 p. m., and if it is over 37.3° C. (99.2° F.) omit walking for 24 hours. Eat an ordinary dinner and go to bed at 9 p. m. Glass of milk during the night.

2. Convalescent afebrile cases: Resembles the above up to noon-hour, when a much heartier meal is permitted—two eggs, underdone meat, vegetables, dessert, weak wine and water or beer; but not tea, coffee or neat wine. Rest of day same as Class 1.

3. Mild febrile cases—not exceeding 37.2° C. (99° F.): At 8:30 a. m. breakfast in bed, coffee or chocolate and bread without butter. Rise at 9:30. Drive out two forenoons per week, when weather is fine. At noon take a very hearty meal, steak, chops, beans, artichokes, cauliflower, cheese, wine and water or light beer. Siesta from 1:30 to 4:30, when another meal is taken of underdone meat with a little tea or grog. From 7:30 to 8 p. m. another meal of white meat, fish or ham,

with some leguminous vegetable. Go to bed directly after this meal. Milk during the night.

4. Febrile cases—over 38° C. (100.4° F.): Breakfast as in Class 3. No walking or driving. Out of doors in chair as much as possible, but avoid evening dew, and also the direct rays of the sun, even upon the feet. To carry out these ideas, a movable tent or something similar is requisite, to protect from direct sunlight and high winds. Diet same as in preceding.

5. Febrile cases—over 39° C. (102.2° F.): In bed night and day, window open. Diet consists of milk, grog, minces, underdone meat, eggs, etc., divided into three or four meals.

6. Cases which have recovered: In bed from 10 p. m. to 8 a. m. Every morning on rising take cod-liver oil or koumiss. Live well. Avoid excitement and late hours (theatres, balls, etc.). Get benefit of climate if possible. After two years probation, occupation may be resumed, with at least two months annual vacation, and constant avoidance of over-work.

The author gives the credit for these various suggestions to Daremberg in his introduction to Chuquet's work, L'Hygiene des tuberculeaux.

CACODYLIC MEDICATION IN TUBERCULOSIS.

Professor Gautier, the eminent chemist, who suggested to Renaut and other practitioners in 1898 that cacodylic acid and its salts might be of value in tuberculosis, has published an article in the Journal des Practiciens, March 17, 1900, in which he seeks to give the results of additional experience with the remedy, and to correct certain misapprehensions on the part of the profession.

He states that cacodylic acid must not be regarded simply as a form of arsenical medicament, for its effects are different from those of arsenic. If the acid is given by any other route than the hypodermic it is decomposed into poisonous and offensive substances, of which cacodylic oxide is one. If the cacodylate of soda (itself inoffensive) is given by the mouth or rectum, a poisonous derivative is formed which causes gastro-intestinal irritation, and impermeability of the kidneys, albuminuria, etc. Gautier has used cacodylic acid hypodermically for three years without having seen any unpleasant consequences, either local or general. He deplores the fact that druggists' wares include numerous pills, solutions and drops of cacodylates. Such medication is irrational and dangerous.

It has been claimed that cacodylates when given to the tuberculous do no more than excite the appetite, and have no specific action on the disease. But Renaut states that he has cured cases in the second stage, and other practitioners have reported favorably, although it is perhaps true that the degree of general improvement is greater than the local amelioration. Gautier himself,however,has seen a patient in which extensive pulmonary lesions appeared to undergo resolution under the drug. His results have been of such a character that he regards his remedy as far superior to creosote, for a number of reasons. For example, the cacodylate may be administered continuously for years, while creosote when given beyond a certain point acts as a depressant. Gautier advises the use of iodide of potash inwardly as a synergist, on "empirical grounds." (The same drug is given during ordinary arsenical medication as a preventive of arsenicism.—Ed.)

The injection dose of cacodylate of soda is 5 to 10 centigrams. Among the collateral effects observed are a tonic action upon the hair, which becomes abundant and glossy; while the voice also improves in strength.

While Professor Gautier uses the terms "cacodylic acid," "cacodylate of soda" or simply "cacodylate" interchangeably throughout his paper, the sodium salt is the drug actually employed and recommended by him.

Discussion: The preceding paper having been read before the Societe Med. des Hopitaux, a discussion took place, opened by Danlos, who stated that (in certain cases only) the action of cacodylate was indeed remarkable for its great roborant effect. It was all-powerful in the pretubercular period, but under all circumstances its action was general and it could not modify stethoscopic symptoms. It could be given in minute doses by the mouth, without prejudice.

Widal and Merklen agreed with the previous speaker. The drug is of use in tuberculosis and leucocythaemia, but does not modify the course of either disease.

Hagem stated that the cacodylic medication promoted nutrition—nothing more.

Rendu has seen appetite and strength quickly return after the hypodermic use of the drug under discussion. When given per os the breath soon acquires an unbearable odor.

Barth had seen disagreeable effects follow the hypodermic use of the drug.

ON NEW REMEDIES AND NUTRIENT SUBSTANCES IN THE TREATMENT OF TUBERCULOSIS.

Schroeder (Zeitschrift fuer Tuberculose and Heilstaettenwesen, March, 1900,) says that despite the innumerable substances which have been uselessly employed in connection with the therapy of phthisis, there are certain indications which we are justified in meeting with symptomatic remedies. He limits his present study to a consideration of such drugs and nutrient preparations as have recently been introduced to the medical profession.

For the irritable cough of the phthisical subject and for the pains which accompany pleurisy and laryngeal and intestinal tuberculosis, narcotics must eventually be resorted to. In addition to the somewhat older codein and peronin we now have dionin and heroin to pass upon. While dionin is a safe remedy in doses of 1 to 3 cgms., heroin must be employed with caution; and because of its toxicity, the maximum dose should not exceed 5 mg. Even in small doses the excitability of the respiratory centre is lowered, and the drug therefore becomes of value in dyspnoea as well as for cough. Unpleasant symptoms often follow even moderate doses, so that its effects must always be closely watched. Other antidyspnoeic remedies of proved value are oxycamphor (or oxaphor) and iodipin.

Antipyretics flood the market at the present time. Numerous authorities recommend citrophen while others speak well of aspirin. Both these drugs are doubtless of benefit in pleuritic and rheumatic pains. Cosaprin and phesin appear to be too weakly antipyretic to be indicated in phthisis.

For night-sweats formalin (40 per cent. formalin-solution, with absolute alcohol, equal parts) is recommended for external use. The anorexia of phthisis is a trying symptom, and attempts have been made to devise something trustworthy to neutralize it. With regard to validol (menthol combined with valerianic acid), it is very doubtful if this substance will prove of much benefit as a stomachic. Several French authorities are using vanadium salts for anorexia. The diarrhoea of phthisis is also a powerful hindrance to nutrition; combinations of idoform and tannin and iodoform and naphtalin, together with tanocol, make up our latest remedies for intestinal tuberculosis.

Of artificial substitutes for food plasmon (caseon) is well thought of by many, because it is pleasant to take, readily absorbed and inexpensive. Eulactol also has advocates. Cod-liver oil has recently been given by enema when not well-borne by the stomach.

Gelatin has been given by the mouth and subcutaneously in haemopthsis.

With regard to possible specifics, thiocol is the most recent of the creosote-derivatives to meet with approbation. Sirolin or thiocol syrup is the most up to date method of administering this substance. Sulphosote and its syrup are preparations analogous to thiocol and sirolin. The alleged good results obtainable from fluoroform have not been obtained by more recent clinicians.

Finally, inhalation therapeutics still play a great role in the treatment of phthisis, formalin being a favorite with some practitioners. As a substitute for inhalations endotracheal injections of iodoform, creosote, etc., have lately been recommended.

FORMIC-ALDEHYDE INHALATIONS.

Dr. Wm. Murrell (Brit. Med. Jour.) describes a series of experiments to determine the comparative effect of the vapors of essential-oils and formic-aldehyde on pure cultures of the tubercle bacillus. The growth of cultures exposed as long as three weeks to air ladened with the vapor of essential-oils (cinnamon and peppermint) was in no way affected, while cultures exposed 48 hours to a current of air passed through a 6 per cent. solution of formic-aldehyde were rendered sterile.

The author then relates his clinical experience with inhalation of formic-aldehyde in 14 cases of tuberculous phthisis. Of these, 12 were greatly improved, while the other two were slightly improved. The treatment was carried out by the inhalation, once or twice daily, of air passed through a 6 per cent. solution, or by the "bib method." Whether or not what obtains for the unprotected bacillus in the culture also obtains for the bacillus imbedded in living or dead tubercle, the fact that every one of the 14 cases improved, is significant.

EDITORIAL.

MISUSE AND ABUSE OF TUBERCULIN.

In another part of this journal we publish a translation of a paper by Dr. Krause in which he reviews the causes of failure of the tuberculin treatment upon its first introduction. This critical review of the earlier publications throws much light upon the subject. At that time and since, those who have arrayed themselves against the remedy seem to have denounced it, because it did not prove an universal cure for all the complex, pathological processes that are present in advanced cases of phthisis, in which many of the tuberculous lesions have undergone various degrees of degeneration, necrosis, etc., and also because of bad or indifferent results when it was administered in an extremely faulty manner.

That such advanced cases of phthisis were doomed to die with or without the use of tuberculin, and that the severe reactions would favor or cause a more rapid decline of the patient, might have been expected. When it occurred, there was wide-spread dismay and condemnation, not of the poor judgment that permitted the use of tuberculin under such circumstances, but of the remedy itself, which was necessarily powerless to resuscitate dead and disintegrating tissue, or to remove the deleterious effects, which their absorption produced upon otherwise exhausted patients, that were so conditioned, that a fatal issue was inevitable, even if by magic every living tubercle could have been removed from their tissues.

Any one conversant with the literature of that period, and who has since followed the contributions to the subject, can have but little doubt but that it was just such indiscriminate selection of cases and excess of dosage, and the stereotyped adherence to it, which caused the adverse effects that enabled Professor Virchow to make the memorable demonstrations before the Berlin Medical Society, and which, instead of accomplishing their object, by leading to a more conservative course and restriction of the remedy to well selected cases, caused the authors and others who witnessed such work to throw aside the remedy, and brand it as a death-bringing evil.

The writer well remembers a conversation with Dr. Paul Guttman in 1890, who then had charge of the Moabit Hospital, where several hundred cases of advanced phthisis were under treatment with what was then called "Koch's Lymphe." Pointing out the severe fever reaction, the increased cough, bloody expectoration, loss of sleep, appetite and weight, as he examined the patients in one of the pavilions with him and Professor Koch, the writer expressed his conviction, that the treatment was certainly doing harm, and suggested that the doses should be given smaller and the increase should be slower, individualizing for each case in such a manner, that no undesirable effects would be produced, to which Dr. Guttman replied in apparent astonishment, and pointing to Professor Koch, who was nearby, "WOULD YOU INSTRUCT THE MASTER?" Renewing the conversation later, and suggesting to Dr. Guttman that Professor Koch was after all not a clinician, that he had but little or no experience in the treatment of phthisis, and had based his views on the therapeutic action of the remedy chiefly upon the animal experiments and upon the favorable effects observed in lupus and in a few early stage cases of phthisis, he still insisted that he should continue to follow the method then in vogue, although he admitted that for the time appearances were bad. He, as well as many others, were then relying upon the erroneous theory that the object of treatment was to produce severe reactions through which the tuberculous material was made to break down, become liquified and finally expelled, and that it was only by the reactions that this could be accomplished.

At that time the pathological studies in Virchow's Institute in cases of phthisis that died under the tuberculin treatment were carried out as they probably never had been before, certainly with a minuteness and diligence that stood in marked contrast to the observations made by the writer when he was a student there. Every local pneumonic process, though it was only discernible with the microscope, was recorded, every miliary tubercle that could be searched out was noted, and the total findings were, of course, in excess of what they were in the writer's time, when if a case of phthisis came into the post-mortem room it usually received but scant attention, and often none at all beyond the making of a routine record.

Many things were thus charged to tuberculin that have been seen before and since without its use, and while, no doubt, there were instances in which tuberculin was properly suspected to have caused complications, yet, as Virchow, himself, acknowledged, nothing was found that could not also have occurred without the remedy; the point of frequency of pneumonic complications and miliary tubercles being the chief causes for suspecting the remedy. This apparent frequency, however, I believe was at least in part due to the very minute, painstaking autopsies that were made, and which had for their object the finding of any changes, good or bad, that tuberculin could have produced.

The clinicians that up to that time gave tuberculin were comparatively few, because of the limited supply of the remedy, but the condemnation, based upon Virchow's findings, was by no means shared by them all. Those who have then and since written against it, have nothing but that unhappy time and experience for the cause of their opposition, and some of them have harped upon the "mobilization of tubercle bacilli," ad nauseam, without ever having had a single personal experience that could give a semblance of support to these and other theories, as to its danger and undesirable effects.

The paper by Dr. Krause will undoubtedly cause a reconsideration of opinions derived from writers, many of whom are but little or not at all qualified to express them, and those who are not prejudiced against the remedy will agree that it is not the pathologist, but the clinician, who must be the ultimate judge of the value of any therapeutic procedure, be that the use of tuberculin or anything else. That in spite of the increasing favorable attitude of the general profession, toward a more rational use of tuberculin in selected cases, and in spite of the unwavering stand by those that have the greatest experience in its clinical use, the enemies of the remedy will not be silenced at once, is quite to be expected, for the condemnation with them rests chiefly upon theory, and we can hardly expect that after having become so strongly committed to an adverse one, they will readily acknowledge their error, for "One convinced against his will, is of the same opinion still!"

We much regret that we have not space to reproduce in full the article by Dr. Joseph McFarland, which appeared in the March number of this year in the International Medical Magazine, in which one does not have to read between the lines to observe the prejudice of the author against the remedy, or any of its modifications. After giving some incomplete data on the methods of the manufacture of some of them, he considers the physiological (?) action of crude tuberculin which he sees in its power to produce reactions in tubercular animals and man. He also cited various experimentors, who have endeavored to produce antitoxic or immunizing serums, and speaks of the claims that have been made for their preparations in experimental as well as in practical medicine. Without having adduced any evidence whatever, but his own opinion, he states that because tuberculin in excessive doses is injurious, it does no good when the doses are small.

The tuberculin-test, the author claims to be injurious; in support of this he relates an autopsy upon a patient, that had been tested with tuberculin six weeks prior to death from miliary tuberculosis, following Pott's Disease. The author says, that upon autopsy he found each tubercle surrounded by a zone of hyperaemic vessels, and that their centres appeared softened and depressed, and that these anatomical conditions observed so long a time after the cessation of the febrile reaction to the test, was a great surprise to him. He considers that this finding would explain the fact that cattle having reacted to tuberculin, frequently fail to reáct to the same dose again, not because of any immunity, but probably because the local reaction induced like conditions as he observed in this post mortem under which the tubercle toxins had been absorbed and could not re-accumulate during the continuance of the hyperaemia, and therefore no reaction followed if tested before it (the hyperaemia) had disappeared.

The use of tuberculin, the author says, does not depend upon a well established principle, and is entirely contrary to all that is known about the action of the substance. In the next paragraph, however, he states that originally the treatment was based upon the assumption that it contained the essential toxic elements of the tubercle bacillus, and that its progressive administration would be followed by immunity, and after stating that in its therapeutic use it had no influence in curing or in prolonging the life of animals, he nevertheless quotes Pfuhl, as having prolonged the life of guinea pigs from eleven weeks to eight months; although after death they showed no evidence of healed or healing lesions.

The claim that beneficial results follow the use of the remedy in judicious doses, Dr. McFarland says, is an assumption not warranted by known facts, since, as the remedy could act only through the induction of immunity or by its local effect, the former failing, and no local reaction being induced by the small doses, it does no good. The favorable clinical results reported from its administration he believes to be due to other factors, such as change of climate, dietetic and hygienic management, tonics and to the hopefulness of the patient, conditions, which, he says, have never been successfully eliminated as means in the claimed improvements, and which are capable of bringing about infinitely better results than tuberculin itself.

The use of tuberculin-R, the author thinks more logical, as an immunizing agent, it coming much nearer than the original tuberculin to actually representing the specific toxin. But the serums derived from animals that were immunized with it, like that of Fisch and other similar preparations, have all failed in curative properties.

That this paper is evidently written in a hostile spirit to specific medication for tuberculosis, the same as many others that have appeared in current literature, is quite evident, especially so, if we take into consideration that not only the adverse, but favorable reports, that have appeared in current literature, must have come to the author's notice. He ignores many other animal experiments that have been more successful than those of Pfuhl, but if Pfuhl's results were the best for the old tuberculin, they would still mean a great deal for its value, showing that it can prolong the life of a guinea pig from eleven weeks to eight months, especially when we consider that in such animals the disease becomes disseminated at an early period and follows invariably a rapidly fatal course. If such prolongation of life can be obtained in so non-resisting and small an animal as a guinea pig, in which, by comparison of size and weight, the relative degree of tuberculosis, even in its beginning, is so greatly disproportionate with that of man, the claim that the remedy is either injurious or of no value is apparently not well founded.

Much better results have, however, been obtained, and actual immunity has been produced by Professor Koch and others with substances obtained from the bacillus itself.

Curiously enough, our own experiments and clinical results, some of them published in a reputable journal (The Therapeutic Gazette) in the author's own city, seem to have escaped his notice, like a great many other contributions which were favorable, and which offer as much evidence for the curative influence of tuberculin products when properly employed, as can be demanded, or is usually demanded, for other therapeutic agents. That it should be necessary to prove the value of tuberculin regardless of other favorable factors, such as proper diet, hygiene or climatic environment and in a patient who brings no hopeful attitude toward our therapeutic efforts, seems to us an absurd proposition.

The author also refers to the application of the remedy in far advanced cases in which it is said to have done harm, but he probably knows, although he does not seem to manifest it, that to treat tuberculosis is one thing, and to treat the results as they become manifest in caseous tissue and destructive processes and suppuration is quite another, and that in most cases of phthisis more or less of the latter changes are actually present. No sane clinician, or one who knows and understands the advanced pathological lesions in phthisis, would undertake to remove them with any specific remedy, no matter how high a degree of immunity it might be able to confer, or how much curative power against tuberculosis it might possess, and in making the deadhouse findings of Virchow in 1891 an issue against the value of tuberculin, when it is known to have been used in excessive doses and in just such advanced cases, is as unjust as it would be were we to deny the value of mercury or of iodide of potash in syphilis, when its last stages had been treated with excessive doses, which had failed to remove caseous and suppurating gumma, and in addition had done harm by their poisonous effects.

The reaction, with fever, malaise and other general disturbances and accompanied with increased physical symptoms, the author seems to look upon as the physiological action of tuberculin, and it should be here stated that the writer and many others who now use tuberculin preparations, look upon such results as toxic and poisonous, and as representing over-doses.

The author,however,denies the value of small doses,because they do not produce such reactions, that is to say, a poisonous effect;—a most singular position in therapeutics, when most of our remedies, and indeed our most valuable ones, act in just such a manner, and without betraying their presence in the organism by the occurrence of fever, malaise or general symptoms, or by producing intense congestion of the diseased tissue.

From the published results, of cases treated both in this country and in Europe, there can be little doubt that there are at this time thousands of people living who have recovered from the early stage of pulmonary tuberculosis or of phthisis in 1891 and since, under the use of tuberculin preparations, and it will not do for the author to ignore all these results, because some of them could be claimed to have lived in a favorable climate, or to have been given proper diet and hygienic care, or both.

Against all this evidence, Dr. McFarland has not a single clinical case to refer to, and he even attacks the value of tuberculin for diagnosis, by claiming an element of danger from the resulting reactions, because six weeks after such a diagnostic dose he discovers caseous softening of tubercles surrounded by a hyperaemic zone. Verily, this is carrying hostility to an almost unpardonable degree, for Dr. McFarland must know, that such a finding is nothing so very uncommon in miliary tuberculosis, and has been observed by pathologists long before they knew that there was a tubercle bacillus, or thought of such a thing as tuberculin. Being a practical pathologist, he must undoubtedly have observed like vascular zones or evidences of peripheral reactive inflammation of miliary tubercles, especially upon the parietal pleural surfaces where they occur quite commonly, and which are also found in the deeper lung tissues; and he must be acquainted with the minute peripheral pneumonic alterations enclosing miliary and larger nodules when undergoing caseous softening, which have been shown to be the result of mixed infection; but, as we have heretofore had occasion to state, the opposition to tuberculin does not come from physicians that have experience in its use, but from those who in the earlier history of the crude product met with disappointment, and by others that continue to re-echo the failures obtained at that time. If, however, no other evidence was available, than that which has never been questioned, namely, the healing of the lupus and of tubercular ulcerations in the larynx, it would still be sufficient to show that this remedy can do, what no other ever did, and it would justify the expectations of results which clinicians claim to have obtained in pulmonary and other forms of tubercular disease.

The fact that many advanced cases and cases of healed lupus have relapsed for reasons which we now appreciate better, does not speak in condemnation of the remedy, on the contrary, even if all of them relapsed, but the tuberculin treatment having shown healing to have actually taken place, it would still justify the claim that tuberculin preparations are valuable, they being the only ones that, acting through the blood, can produce such a result.

In conclusion, it certainly would be interesting to know how the author would explain the fact that under the use of such remedies, when given for a long time and in increasing doses, the patients that received them did not grow worse and die, that the majority of them have been getting better, and that many of them have recovered to a degree; that they have enjoyed good health for many years, and have at least obtained so much of a cure or immunity, that years after the completion of their treatment they have failed to react to the tuberculin-test. Surely he could hardly claim the continuance of the hyperaemic zone to be the reason that the test, made years after the completion of the treatment, proved negative.

SUPPLEMENT TO THE JOURNAL OF TUBERCULOSIS.

In this part the whole subject of Pulmonary Tuberculosis will be covered by a continued series of articles written by Dr. Karl von Ruck to appear in the following order:

Article I.—The Cause of Tuberculosis, and the conditions which predispose to its acquirement. Article II.—The Prevention of Tuberculosis. Article III.—The Pathology and Symptomatology of Pulmonary Tuberculosis. Article IV.—The Diagnosis of Pulmonary Tuberculosis. Article V.—The Prognosis of Pulmonary Tuberculosis. Article VI.—The Treatment of Tuberculosis, dietetic, hygienic and symptomatic. Article VII —The Climatic Treatment. Article VIII.—The Specific Treatment. Article IX.—Laryngeal Tuberculosis, its diagnosis and treatment. Article X.—Institutions for the Treatment of Pulmonary Tuberculosis.

THE DIAGNOSIS OF PULMONARY TUBERCULOSIS.

Every practicing physician recognizes the importance of an early diagnosis in any disease for which he may be consulted. Even in incurable diseases, it is necessary that we should have an early and correct appreciation of their nature, to guard us in our prognosis, and to avoid methods of treatment which can be of no avail.

Many of the diseases, which are incurable when an advanced stage has arrived, are, however, amenable to treatment in their earlier stages, and pulmonary tuberculosis being one of these, I desire to first consider some of the causes, on account of which the disease is often allowed to make fatal advances before it is recognized by the attending phyisician.

One, and probably the most frequent cause lies in the vagueness of the symptoms which attend the truly early stage of tuberculosis, and which many patients neglect as unimportant, resorting at most to some home remedies, or patent medicines, without consulting a physician; a course which for the time is apparently justified, inasmuch as the symptoms usually intermit or subside again for longer or shorter periods of time. In instances where a physician is consulted and makes a correct diagnosis, he is liable to be discredited either by the patient, when such an intermission takes place, or by his neighbor practitioner who may have failed to appreciate the true state of affairs; under all circumstances it will be found difficult to convince the average patient or his interested friends that the slight symptoms of general malaise, loss of appetite and strength, or decline of a few pounds in weight, mean really the onset of so serious an affection as pulmonary tuberculosis, and though we may succeed while the symptoms last, their disappearance makes the interested parties again skeptical, since their ideas of tuberculosis are derived from what they have observed in cases of consumption, that have reached a progressive or downward course.

Such being the case, it requires as yet a great deal of popular education as to the cause, nature and early symptoms of the disease; and the latter should be persistently pointed out on all proper occasions by the general practitioner in his family practice. Especial emphasis should be laid upon the fact that the early mainfestations of pulmonary tuberculosis do not imply the presence of consumption, that the latter term indicates an advanced stage of the disease, which may be prevented by early treatment, before manifest disorganization of the lung has occurred.

If the public could be made to understand and appreciate this, it would have a desirable influence upon their attitude toward our endeavor to have patients seek proper advice at a period when pathological changes are such that they can be made to disappear by proper treatment.

Regardless of the attitude of patients or of their friends toward our opinions and advice in regard to this early formative period of pulmonary tuberculosis, it is, however, also to be admitted, that in the routine of general practice, physicians frequently fail to recognize it, and to the extent that this occurs, the blame falls upon the ability or resources of the profession. While we are not to be blamed, for neglect on the part of our patients to consult us, our own shortcomings must be recognized and corrected, which can only be done when the disease receives the attention and study that its prevalence demands.

The great frequency of tuberculosis is attested, not only by its mortality directly, but also by the fact that after death from other causes, recent, latent or obsolete tubercular processes are found in nearly half of all post-mortem examinations when dilligent search is made to find them; justifying the assumption that at least two-thirds of all persons acquire an infection sometime during their lives and cautioning the practitioner that he is liable to meet with the disease in many of his patients.

In making this statement I, of course, do not imply that two persons out of every three we meet have tubercular lesions somewhere within their tissues, because those in whom they are found after death, represent but a small per cent. of the living population, and have not been tubercular all their lives. Much less would I imply that patients who consult us professionally have so frequently a tubercular basis for the cause of their complaint; on the contrary, I have already pointed out, that in the true beginning the average patient is likely to pay no, or but little attention to the early eruptive stage, and in the consideration of the pathology and symptomatology, we have seen that latent deposits can exist in the presence of apparently perfect health.

Nevertheless, I remember a good many instances from my general practice, in which the early symptoms were present and were for the time attributed to other causes, in which a better knowledge of the subject, and a more painstaking course on my part would have preserved me from error, and in the years of special practice since, I see that many colleagues are still making similar mistakes.

With the knowledge that we have gained up to the present time, it has become plain, that even without the presence of a consumptive family history, we must give much closer scrutiny to the cause of certain ailments, which appear of a more or less transitory character, and which we are apt to attribute to digestive disturbances, over-work, worry and the like, without actually convincing ourselves that our theory is correct, and that it is necessary to exclude tuberculosis, in all cases, that point to nutritive disturbances and general decline of vigor, even in persons whose family history is clear from a tubercular taint.

In many such cases we are liable to accept the patients' statements as to the cause and nature of their complaints, and unconsciously allow them to make the diagnosis; and while some such routine prescribing will probably always prevail, for safe and satisfactory practice, we should do as little of it as possible. Particularly should we avoid it when by physical, microscopical or chemical examination we can obtain contributory or actual evidence of the nature of the affections we are considering or prescribing for; and such methods should certainly be resorted to at subsequent consultations, when the difficulty does not seem to have yielded to the remedies that may have been employed. Such examinations will many times elicit nothing beyond the confirmation of our first impressions, based upon the statements of our patients, but there are instances, when such a course is the only one, that can preserve the practitioner from more or less serious and sometimes ridiculous blunders, which not only injure the reputation of otherwise very able men, but throw discredit upon the profession as well.

Such carelessly or hastily considered cases are at times seen in consultation practice, and while the peculiar circumstances that may have existed in particular instances, may mitigate the blame, there are other instances in which persistent carlessness and sometimes gross inability remove every shadow of an excuse.

In pulmonary cases the following part of a history is an example: "The patient had been under constant treatment for eight months for bronchitis, without ever having had a physical examination of the chest, or a microscopical examination of the sputum. The evidence of bronchitis existed, but it was circumscribed and accompanied by other evidence of structural disease, the sputum contained tubercle bacilli in great numbers, the temperature had never been taken, although there was a distinct evening fever, and the patient had lost 13 pounds in weight."

Without considering our duty to the patient, painstaking efforts in diagnosis which prevent such errors, when practiced year after year, are a means for self education of inestimable value; and when we also make and preserve careful records of our clinical labors in every important case, we accumulate a stock of most valuable evidence, which is not only of great benefit to the particular physician and to his patients, but also to the profession, if used in contributions to the general stock of knowledge and experience. Such a course keeps us at a point of keen interest in our labors and relieves the latter of a sense of disagreeable routine, otherwise unavoidable.

A frequent objection to such a course is that it takes too much time; but this is really no valid objection at all, for I am confident that if we seem pressed for time, we can often save it by curtailing social and irrelevant conversation when visiting or consulting with our patients, and by the cultivation of a systematic employment of our time during the hours which we devote to professional labors. It will then also be found that the time necessary for exact methods of practice becomes less, as we become more perfect through self-education and practice in the employment of the necessary instruments of precision, etc.

Inadequate fees or the unwillingness of our clients to pay for our time in making such painstaking examinations and inquiries, which have been adduced as objections, can eventually be overcome, if by the limit of the number of patients we can properly attend, we find our income inadequate; for surely by the time we have arrived at so fortunate a dilemma, where under a systematic employment of time, applicants for our services remain unattended, we can safely demand equitable compensation, and if we have before that time received less than we believe ourselves entitled to, we may console ourselves with the knowledge we have acquired, and with the reputation won, without either of which this increased demand for our services would probably never have occurred.

For such as plead inability, because of want of opportunity, either during their student life or since, to become sufficiently conversant with exact methods of diagnosis, and if they have not sufficient scientific training, or perseverence to acquire them without special instruction, we have now a number of excellent post-graduate courses, where every facility is afforded for their ready acquirement. There are indeed few physicians who cannot profitably take occasional advantage of such post-graduate instruction, and the best and foremost men in the profession find it necessary to profit from the special knowledge of colleagues pursuing special lines of labor either at home or abroad. It can only be to the credit of him who seeks to keep abreast with the advances we make in our profession, and all honor is due to such, who although growing old and gray in their life's work, are still students of the mysteries of nature, and of their interpretation in health and disease; and a physician who has ceased in this study, or finds no interest in it, has only one honorable course open, and that is, retirement from the responsibilities of the practice of medicine.

In the inattention to these matters, and in the loose conceptions as to our duties to patients and to the profession, and in the want of ambition for a position above mediocrity, I see some of the most frequent causes for failure on the part of physicians not only in the diagnosis of the early stages of pulmonary tuberculosis, but also in the ready diagnosis of many other affections. Failure in diagnosis necessarily brings failure in the results from therapeutic efforts which leads to the practice of the professsion as a mere trade, and eventually to quackery and charlatanism.

Another cause for routine practice in regard to the diagnosis of tuberculosis may find its explanation in the little or no faith some practitioners seem to have in the means we possess for the cure of pulmonary tuberculosis. Such a position is certainly no longer justified, if it ever was, the evidences of recoveries being so numerous that those who care, can easily satisfy themselves of their frequent occurrence. Indeed, under a judicious and persistent use of the means at our command, recovery should be the rule, and within the reach of accomplishment of every physician, if he will only make, or have the opportunity to make, his diagnosis in time.

I expect to show in the succeeding pages that in practically all those cases in which we are consulted on account of symptoms or failing states of health due to the beginning of tubercular disease, the diagnosis can be made, with equal or even with greater certainty, than is possible at a correspondingly early period of other diseases, and that coarse physical changes in the lung need not be present, much less need we await destructive changes of lung tissue and therewith the advent of the tubercle bacillus in the expectoration, before we can come to a proper conclusion.

The ability to do this must, however, become the common possession of the profession at large, and especially of the general practitioner —the family physician;—the expert specialist can probably do this now, but he is not the one who sees the early and incipient phases of the disease. With rare exceptions these are seen in general practice only, or if they come under the observation of a specialist, it is as likely to be one whose specialty is something else, perhaps gynaecology, neurology, diseases of the digestive organs, etc. Such specialists give as a rule so little attention to tuberculosis that the chance for a correct diagnosis at their hands is not materially improved; on the contrary, if they find anything to mend in their respective departments of expert practice, the true diagnosis will be yet further delayed.

As the matter now stands, the early stages go unrecognized in the great majority of cases; either because we are not consulted, or because of the diagnosis being delayed by the consulted physician, until a more advanced stage gives unequivocal evidence of the nature of the disease by continued cough with expectoration, loss in weight and strength, night-sweats, haemorrhages, hectic fever, etc.

It is all very well to write and agitate a crusade against tuberculosis which shall go even beyond the actual presence of the disease, and reach the root of the evil, through eradicating the predisposition to infection by reclaiming the human race from physical degeneracy. While fully in sympathy with such a movement, I cannot but express fears that the "physical degeneracy" which predisposes to infection, has its cause and predisposition also, in vice and other moral deficiences, and in ignorance of the laws of nature in regard to health, or in the ever increasing struggle for existence, under which the less advantageously circumstanced are subjected to exposures, hardships and privations of many kinds, that are beyond their control or their ability to overcome.

Until we can remedy these evils, tuberculosis will thrive and find its victims as heretofore, and to curb it now we must lessen the sources of infection, which can only be accomplished through the general practitioner, by imparting proper knowledge to his patrons and by being in a position to recognize its presence, before the patient has had an opportunity to infect members of his family, or those with whom he comes in contact in the work-shop, store, office or in public places.

We see, therefore, that not only successful treatment, but also successful prophylaxis depends upon the earliest possible diagnosis by the family physician, who in more than ninety cases out of a hundred is the first one to be consulted,—his opportunities and responsibilities are therefore very great.

That good will come by working in the direction of preventing or eradicating the predisposition also, is not doubted, but it seems to me that its accomplishment offers by far greater obstacles, which must be overcome in the natural progress of things through teaching and example of morality and through adjustment of social and economic conditions, toward all of which we can contribute, but which do not come directly in the sphere of practical medicine.

The interest in tuberculosis shown, not only by the medical profession, but by the public as well, has reached a degree which will not only prevent retrogression, but will compel advance. Let the public once fully understand that the disease can be prevented, that it can be diagnosed early, and can be treated successfully when so diagnosed, then its influence will be strong enough to compel equal vigilance and care in its prompt detection, as is now the case with acute infectious diseases; such as smallpox, scarlet fever and diphtheria.

Too much countenance has perhaps been given to failure in diagnosis on account of the obscurity of the early symptoms, and while no doubt they are at times misleading, the grave errors and neglects which are still common when the symptoms are plain and unmistakable, are destined to lead to severe censure, if not to charges of mal-practice at no distant date. As instances of such reprehensible practice, I append a few additional histories, and I regret to say that they are not rare exceptions in my records.

Case I. Young married woman, wife of a consumptive, pregnant in the seventh month, gives no history of probable infection prior to her marriage one year ago; has always enjoyed good health with the exception of an attack of grippe two years ago, from which she made a good recovery. While sitting in her room, she suddenly had an attack of coughing and raised several mouthsful of clear blood. Her physician being called, made no examination of any sort, except to look into her mouth, whereupon he assured her that she was all right, and need pay no attention to the blood which he said came from her throat. In the two months prior to her delivery she coughed daily and with increasing frequency, and consulting her physician on several occasions on account of this cough, he was said to have attributed it to upward pressure of the gravid uterus, and to have assured her that with her delivery the cough would disappear. This assurance was, however, not realized, and during labor she had another attack cf hæmoptysis. Afterward her cough increased, she had fever and night-sweats for a month or more, when an examination was made of her lungs, and with a diagnosis of chronic bronchitis, the patient was sent to Asheville, when she came under my care.

On admission, I found infiltration in the right upper lobe, a moist cavity in the apex and beginning disease in the left lung. Pulse 100, temperature 100.8°, cough moderate, expectoration muco-purulent, containing tubercle bacilli.

Comment seems hardly necessary, and presuming that the patient's statements, which were corroborated by her husband, were correct, her physician was not justified in saying that the hæmorrhage came from her throat, from simply looking into her mouth hours aftar the hæmorrhage had ceased. Knowing that her husband had been suffering from phthisis, he should at once have thought of the patient's liability to infection, should have made a careful examination of the chest and taken her temperature. If such an investigation had proved negative, and the patient continued to cough, the examination should have been repeated, and if again negative, he should have asked for a consultation, instead of giving the foolish explanation of pressure from the uterus to exlain this symptom.

A hæmorrhage, however, occurring during labor in his actual presence, should at least have opened his eyes to the nature of this case, and should on that or on a following day have led to an examination of the chest.

The occurrence of fever and night-sweats with continuance of cough and expectoration confirmed the plain and unmistakable diagnosis even without a physical examination, and after it was made at last, the coarse evidence found by me, was certainly unmistakable in the right upper lobe; but if the physician did not appreciate it, he still might have examined the sputum, or had it examined by some one who knew how.

This case, should, however, have been diagnosed on the physician's first visit after the initial hæmorrhage, as at least a case of very probable tuberculosis of the lungs, simply because the patient expectorated blood, had no heart disease and was exposed for a year prior to infection from her husband.

Upon promptly advising him of the nature of the case, this physician had the audacity to write me that if the patient had tuberculosis, she must have contracted it since she left home, two weeks before!

Case 2. Young man, age 21, mother and two maternal aunts had died of phthisis. Has had a fair degree of health until an exposure for several hours to rain and cold, which was followed by acute bronchitis and stitch-like pains in the right side. After three or four weeks during which he was confined to the house, he improved; no physical examination of his chest was made, nor was his temperature taken by his physician, who visited him daily for the first week, and less frequently thereafter. This was in March, '97. In the following summer his cough subsided, but not entirely, and he still felt weak and languid at intervals, for which his physician prescribed tonics. In the winter of '98, the cough increased, fever and sweats occurred occasionally, and the patient lost weight rapidly; after two months of professional attention, the physician examined the chest at the solicitation of the patient's father. The patient having been required to remove only his coat, this examination seems to have been very superficial, consisting of percussion over the vest and underclothing, and of the application of the ear to the chest in front and behind. The expectoration was not examined, nor was the temperature taken, except once or twice in the forenoon on previous visits. The opinion given was that there was "some bronchial trouble", a sort of winter cold like that of the previous year, and that all would be right in the spring.

At the suggestion of friends another physician was now called in, who diagnosed the case on his first visit, and sent the patient to me in February, 1898. It is needless to say that this patient showed advanced lesions of phthisis, both lungs were involved, he had hectic fever and altogether the prognosis was so unfavorable that the patient was returned home in May somewhat improved. He died the following fall.

The errors and neglect in this case were as manifold as in the preceding one. While a chest examination should have been made at the outset of professional attendance, especially as the young man was slender and was liable to have been infected by his mother ; the occurrence of stitch-like pains indicating pleurisy, and knowing that the great majority of cases of pleurisy, especially when of a circumscribed character, have a tubercular substratum, it was necessary to establish the absence of tuberculosis, before making any other diagnosis. Had, as is improbable, a careful chest and sputum examination shown no evidence of disease, a consultation was proper, or a tuberculin-test should have been made. But although the diagnosis was unnecessarily delayed at the beginning, the patient feeling weak and languid at times during the following summer, and still having a slight cough, it was an imperative duty to determine its cause, and to exclude tuberculosis. It seems incredible that with the renewal of more active symptoms in November, a physician should have attended such a case two months longer during which he witnessed the progressive downward course ; and when by the use of the fever thermometer alone, he should have been able to reach a proper conclusion, provided he took the temperature, or had it taken, at frequent intervals during the day. The final chest examination at the request of the father by percussion and ausculation through various thicknesses of clothing was of course no better than if none had been made, and the whole care and management of this case over a period of nearly a year, was nothing less then criminal neglect.

Case 3. Patient, a man of 26 years, without any history of phthisis in his family, or known exposure to infection, and of good physique, suffered from grippe in April, 1898, when he was confined to bed about three weeks and his physician diagnosed pneumonia in the right, upper lobe. His convalescence was incomplete, and cough has continued ever since. In June another chest examination was made by percussion only, and the pneumonia was said by the doctor to have cleared up entirely, and that the remaining cough was due to bronchitis. A sputum examination was also made, but the result was not known to the patient, when he came under my care. He had been treated with tonics during the summer, and improved in his general health, but the cough and expectoration did not grow less to any appreciable degree. His temperature was not taken excepting during confinement to his bed with the attack of grippe. In September, the patient had a hæmorrhage and then the diagnosis of phthisis was made, and the patient was sent to me at once, without further examination.

A physical examination on his admission showed a large cavity with tympanitic resonance in right upper lobe, and involvement of the upper, and part of the lower lobe of the left lung. Temperature varied between 99° and 101°; pulse 108, respiration 22; the patient was short of breath on exertion; anaemic; his loss of weight since June was 9 pounds, and since the attack of grippe, 26 pounds; the sputum contained tubercle bacilli and other pathogenic germs. The patient assured me that he and his wife had frequently asked his physician if his lungs were affected, and received a reassuring answer each time, and again two or three days before the hæmorrhage, the physician said that there was nothing wrong with his lungs, whatever. This statement was corroborated by his wife.

In commenting on the delay in diagnosis in this case, the physician had no right to a negative opinion, simply because there was no known exposure to infection and the family history was good, such being the case in 60 to 70 per cent. of all cases. Neither could he ignore the possibility of tuberculosis, because of the patient's fine physical development, since many such cases acquire phthisis. When he found a pneumonia confined to an upper lobe, he should have become suspicious, as this localization frequently indicates a tubercular form, or active inflammatory processes in a previously latent tubercular deposit (which was probably the case in this instance); but when in June the pneumonia was thought to have cleared up, there was evidently a serious error, probably by mistaking the tympanitic resonance for a normal note, for the cavity was no doubt formed at that time. Tubercle bacilli must have been present in the sputum and a careful examination should have demonstrated them. A continued temperature record, after the acute attack would undoubtedly have shown a more or less pronounced hectic type of fever, but the progressive loss of weight and the continuance of cough and expectoration were alone sufficient for a diagnosis, there being nothing else present to need exclusion, all symptoms pointing to phthisis.

Case 4. Young girl, age 16, lost her sister of phthisis in September, 1896, she helped to care for her during her illness, during the three months preceding her death. Up to this time the patient's health was good, and she weighed 145 pounds. In October she lost her appetite, and complained of a sense of great exhaustion and fatigue.

Her physician ascribed these symptoms to her mental state and to her grief, and gave her a tonic. She soon lost her color, and in December she weighed only 120 pounds. There was, however, no cough, no pain, and nothing special in her complaint, to attract attention to her lungs. Her temperature was never taken, neither was a chest examination made.

In December, her menses were missed entirely, instead there was a leucorrhoeal discharge, the presence of which was thought to justify a local examination by her physician, upon which he stated, that he had discovered the cause for the girl's general decline. From now on she received local treatment three times a week until February, when, at her mother,s request, the treatment was suspended, and the doctor consented that she be taken south for recuperation. This brought her to Asheville, where after a horseback ride she expectorated a little blood. Examination of this patient showed well marked physical symptoms in both upper lobes, she had daily elevations of temperature of between one and two degrees, and had lost 11 pounds in weight since December, and 36 pounds since the beginning of her illness.

While in this case the diagnosis was not as evident as in the previously related histories, the fact that the decline in general health was not to be explained by any other cause, should have awakened suspicions of the strongest kind, that tuberculosis was at the bottom of the general decline ; even if the exposure to infection had not occurred, and the family history had been perfect. As it was, there was every reason to be on guard, that the history of the sister's case should not be repeated, and careful chest examinations and temperature observations should have been made. Nothing being found, a tuberculin test should have been applied, instead of subjecting this young girl to an examination of the genital organs which gave no symptoms excepting that the catemenia were replaced by a leucorrhoeal discharge.

Although this girl recovered, the time for necessary treatment would probably have been much less, and but for the blood expectorated after physical exercise, the diagnosis would undoubtedly have been still further delayed.

While such and similar instances of unduly delayed diagnosis have come to my notice quite often, I am pleased to say, that of late years (perhaps with increasing frequency), I meet cases who appear to have had painstaking care and attention by their home physicians, and that in such the diagnosis was often made as promptly as was possible for any one to do. In quite a number of cases that I examined in the last few years the symptoms were slight, and a tuberculin test had to be resorted to, to complete the diagnosis. Without a single exception, all such cases have made a prompt recovery, and so far as I know, no relapses have occurred.

I look upon such early diagnoses by general practitioners, who make no pretence to special ability, as a most hopeful sign for the future, and although still exceptions, they indicate that with the great interest in and the continued discussions of the subject, we are reaching a period when many other physicians who have heretofore waited for advanced symptoms or for the advent of tubercle bacilli in their patient's sputum, will more thoroughly familiarize themselves with the truly early stage of the disease and will acquire the necessary skill that will enable them to do their duty equally as well to their tubercular patients, as they do to many others, suffering from less familiar disease.

In now entering more particularly upon the subject of diagnosis of the several forms and stages of pulmonary tuberculosis, I shall devote most of what I have to say to the earlier stages. Some authors still recognize a pre-tubercular stage, a distinction which I believe to be untenable, if by it we mean a period preceding the onset of the disease in which there are as yet no tubercles.

If, however, by the pre-tubercular stage we should mean a state of health that favors the occurrence of tubercular infection, then all those that are predisposed in the sense shown in the section on Etiology, are in a pre-tubercular stage, but being as yet free from infection such a state of health has as yet nothing to do with the disease itself, and with its division into different stages.

A pre-tubercular stage could only then have a place in diagnosis, if there was a prodromal stage, with certain definite change in the general health or in the lungs, which was peculiar and preceded actual infection, which is of course not the case, and, so far as I can understand it, this so-called pre-tubercular stage is really the early eruptive stage of tubercles, and the symptoms given by some of the authors correspond exactly with those that occur at such time.

THE EARLY STAGE OF PULMONARY TUBERCULOSIS.

By this stage I mean the period of the disease in which the lung is first invaded by tubercle bacilli, and during which tubercles form in the lung tissues. This stage must be distinguished from the early stage of phthisis, and the latter term should, in my opinion, be applied only after destructive processes in the tubercular tissues have been initiated. Tuberculosis of the lung may eventually reach such a stage, or it may not.

The circumscribed eruption of tubercles may occur at intervals with a considerable period of intervening latency, during which there are no subjective symptoms, and, under favorable circumstances, the latency may result in a cure, by the tubercles undergoing fibroid transformation, or having become caseous by becoming permanently encapsuled. With such a disposition of all the tubercles, the recovery is complete, and with it ends the purely tubercular disease in the lung.

The fibroid transformation and encapsuling of tubercular deposits is undoubtedly a slow process, liable to extend over many months or years, and to be interrupted by the advent of destructive changes through failure in nutrition, and by the occurrence of acute diseases, especially those which involve the lungs. We see, therefore, that measles, whooping cough, grippe, acute bronchitis, typhoid fever, etc., are often followed by phthisis, not that these diseases have necessarily favored the occurrence of the infection, but rather that they have intervened during the existence of a latent tubercular deposit, and that by reason of the local inflammation and nutritive disturbance they have checked the natural process of a cure and brought about the softening of the caseous material in process of encapsulation.

The early stage of chronic pulmonary tuberculosis means the eruption of tubercles in the lungs; and its duration is variable. The time occupied from the earliest beginning and during the gradual extension from the primary focus to a degree that there are subjective or objective symptoms, we do not know. Such extension may be rapid or slow, continued or interrupted, and the process may stop without ever having suggested its presence by any symptoms whatever, or may continue until a part of, or an entire lobe is involved, when, as a rule, a more lasting pause, the so-called latent stage, is likely to intervene.

Clinically, we can only speak of the duration of this stage from the time of its earliest possible recognition, and experience has shown it to vary within wide limits, cases having been observed in which the extension was rapid enough to involve an entire upper lobe in the course of a few weeks, and others in which but slight extensions occurred at long intervals, so that in several years but a limited portion, as an apex, was all that was involved.

The reader must therefore not suppose that even in this earliest recognizable stage, nothing but miliary or submiliary tubercles are present; this is only true in so far as the involved lung is subject to interrogation by physical examination, or with a more general invasion, perhaps through the blood, but not in the chronic form, which usually starts from one or several deeper seated centres, and gradually reaches the periphery. What the deeper alterations may be, our examinations during the life of a patient do not reveal; pathological anatomy, however, teaches us that we may assume the presence of larger nodules and of tubercles in all stages and degrees of degeneration or fibroid transformation; it is only that which transpires to within a depth of perhaps a few inches from the surface, that we can hope to recognize.

To diagnose this stage in the cases that consult us, we must depend largely upon circumstantial evidence, in consideration of which the family and personal history of the patient is very important.

As regards the latter, it is necessary that we discard the still prevalent belief in the actual inheritance of the disease; and in a consumptive family history the physician should see nothing more, than that the patient under consideration may have had special opportunity for infection and that people who have inherited a weak constitution are more liable to such infection than those who are descendants of vigorous parents. At the same time, he should never lose sight of the fact that a relative predisposition to infection is probably present in all people, no matter how perfect the family and personal history may be. A phthisical family history justifies a greater suspicion of actual infection in those only who have lived in the family during the illness of other members, but such exposure is likewise suggestive regardless of the relationship.

In the inquiry as to heredity, we must elicit: (1). Whether or not one or both parents suffered from phthisis at the time of procreation, and whether or not at that period (and on the part of the mother, during gestation), the parent's nutrition and constitutional vigor was already impaired, not only by phthisical but also by other constitutional disease. (2). Whether or not one or both parents suffered from confirmed phthisis at the time of the patient's birth, whether or not a phthisical person nursed and cared for the child, and to what degree the patient under consideration has been exposed to infection on the part of members of the family or of others, during infancy and childhood, and up to the present time.

To illustrate this, we would be justified to suspect a greater disposition to the acquirement of the disease, if the parents were in a cachectic state at the time of procreation, no matter from what causes; if the mother was suffering from phthisis or other severe constitutional disease during gestation; and we would the more strongly suspect infection to have occurred, if a phthisical mother, or other person who had phthisis, nursed and cared for the patient; if any member of the household suffered from phthisis while the patient under consideration lived in the same house, no matter whether this member was a direct relative or not.

If, however, a member of a family had developed consumption when the individual was away from home, and had therefore not been exposed to the infection, then the fact that tuberculosis had occurred in the patient's family subsequent to his living with the family, has nothing to do with estimating the degree of liability to the disease, beyond the fact that his tubercular or weakly constituted parents may have transmitted their own physical weakness with which they were affected at the time of procreation and gestation.

If there has not been a case of consumption in a family for many generations, if the grand-parents and parents have lived to an old age, or are still living in good health; but if the patient under consideration has lived with a consumptive, has occupied a room or bed with him, or been in intimate contact with him for a longer or shorter time, has perhaps worked in a shop, store or office with, or has nursed a consumptive, we must more strongly suspect such a patient to have the disease than we would if such exposure had not occurred, and the fact that his family is free from the disease has nothing to do with it, beyond the hereditarily transmitted vigor or weakness on the part of the parents, which constitutional inheritance may have favored or offered resistance to the infection to which the patient has been exposed.

The sons or daughters of parents that have been models of physical development and strength, and whose more remote ancestors have been equally so, are nevertheless to be suspected as predisposed, if they have been exposed to poverty and privations in the period of growth and development, which stunted their bodies and weakened them permanently, or if they have led a life of dissipation and excess, or if from disease of various kinds, especially of the digestive and assimilative organs, they have been reduced in their natural resisting power—even though there is no history of known exposure to infection.

Persons that have been reared and have long lived in cities are, other things being equal, more liable to infection, than those who have always lived in the open country, and more yet, if their lives have been spent indoors; because, in the first instance, there is a greater liability to unknown exposure to infection in cities than in the country, and in the second instance, the vegetative processes suffer from confinement and from want of out of door life and sunlight; so that the natural resistance to infection is reduced.

If the patient has resided for prolonged periods in an unfavorable climate, especially if the dwelling has been on damp soil, and by reason of such environment he has frequently suffered from catarrhal affections of the air passages, his opportunity for infection was thereby increased.

We see, therefore, that while heredity to, and the acquirement of, a degenerated or weakened organism may predispose to infection and to the spread of the disease in the infected organism, this is only a predisposition and not the disease itself,—it is a lowered vitality that may result from other causes than tuberculosis (to which I have referred at length in the chapter on Etiology), and only in so far as the individual is known to have been exposed to infection by reason of the presence of the disease in parents, relatives and others with whom he has lived, and in so far as he may have inherited a weak constitution from his tubercular or otherwise physically decrepit parents, does the presence of a family history of phthisis heighten the probability of tuberculosis.

If the general apearance, the present symptoms, or our previous knowledge of the patient's antecedents, awaken the suspicion that tuberculosis may be the cause of his complaint, a careful elucidation of the history and preparation of a complete record of the same is essential to the diagnosis of this early stage, and should never be omitted. For convenience and systematic inquiry, I have devised a special blank for this purpose, including a diagram for recording the results of physical examination.

As we have seen in a previous chapter, the onset of the disease, that is the development of the primary focus and its slow peripheral growth need not produce any symptoms whatever, and even when it has reached proportions to cause subjective symptoms, none need as yet point to the lung, the patient complaining only of a general indisposition, loss of appetite, weakness, languor, falling off in weight, for which he expects us to prescribe a general tonic, or a particular remedy which shall restore him to his accustomed vigor.

Having followed a busy, general practice for years myself, I am well aware that it is at times difficult to enter into the necessary details of enquiry and investigation with patients who themselves have no idea of anything seriously wrong, and who at most expect to tell us their own explanation for their symptoms, and that, after looking at their tongues, feeling their pulse, and, at most, taking their temperature, we are in a position to prescribe the proper and efficient remedy.

Such consultations will occur in spite of our best efforts, but they are rarely sufficient for an exact diagnosis, no matter what the nature of the illness may be. Our personal reputation, and the interest of the patients, demand alike that we discountenance this sort of practice, and that we do not allow ourselves to be consulted in this manner, excepting under most special circumstances, by patients with whose tendencies to minor disturbances of health we believe ourselves to be familiar, by our previous professional relations with them.

The physician who has made up his mind that he will diagnose as correctly as possible whatever nature of disease comes to his notice, and who is moreover desirous of aiding the crusade against tuberculosis to the best of his ability, has no other course than to do his work carefully and thoughtfully, and he must bear in mind at all times that tuberculosis may be present when in the absence of other recognizable cause the general health appears to suffer.

In this stage of tuberculosis, we must not expect to find well marked percussion dullness, nor any of the coarser, auscultatory phenomena; and, unless the examiner has a well trained ear, and is thoroughly conversant with the subject, he must not conclude that the lung is normal, because he can at this time find no evidence of disease; and even the most expert diagnostician must realize that only when the pathological alterations are near enough to the surface can he expect to obtain evidence of their existence by percussion or auscultation. If the formation of tubercles in the lung is peripheral, or approaching the pleural surface, and is of recent date or just occurring, the recognition of such a process by auscultation is one of the most delicate tasks in physical diagnosis, and percussion especially when not forcible is of no avail at this period; the eruption is as yet not dense enough, the connective tissue proliferation peripheral to the tubercles is not great enough and the bronchioles are not yet sufficiently obstructed, to alter the ordinary percussion note, nor to give rise to bronchial respiration any more than in acute, miliary tuberculosis, where the absence of percussion dullness and well marked auscultatory symptoms beyond those of catarrh has always been a well recognized fact.

In some cases, however, forcible percussion will elicit dullness suggesting a deeper seated older deposit, that does not reveal itself otherwise by reason of the intervening air holding tissue.

In the recently involved area, the note is clear, and may approach a deep almost tympanitic quality, suggesting relaxation of the underlying lung tissue; the inspiratory murmur is either weakened, or it is more or less rough, sometimes both, and it may also be interrupted, but the prolongation of the expiratory murmur is as yet absent. Neither has the inspiration the harsh and sharp quality that appears later, when the vesicular element becomes more and more lost by occlusion of bronchioles, and obliteration of alveoli from caseous and inflammatory products.

One who is not thoroughly practiced is very apt to disregard this weakened or rough quality in the inspiratory murmur, and to acquire the ability to recognize it, we must first get a physiological standard by persistent practice upon healthy subjects. Such practice must be had upon men, women, youths and children, and upon fat and lean subjects, the difference between quite moderate and deep respiration being noted at various levels of the chest. A good stethoscope is indispensible. Those who are interested, or wish to perfect themselves in physical diagnosis, will find my modification of Paul's stethoscope very helpful; it has the advantage of conveying the normal respiratory sounds, without exaggeration and entirely free from adventitious sounds; it can be applied with ease to any part of the chest, without the examiner getting up or down, or changing his position; it can be held with the hand to the locality to be auscultated or be attached by suction, so that both hands are free.

This freedom of the hands permits percussion during auscultation, and if a table is kept to the right, we can also make a record of what we hear while we are hearing it. For such a record the diagram which I devised and which forms part of my examination blank is very convenient and valuable for comparison with subsequent examinations. Only after having become perfectly familiar with normal respiration and with its modification, as it may occur in different individuals in quiet, moderately deep, and in forced breathing and in different localities of the chest, can we be in a position to recognize as abnormal such slight changes as occur in the character of the respiratory murmur in this early eruptive stage.

Beyond the weak or rough character of the murmur we may also note one or several interruptions during inspiration, and if this corresponds to the area where the murmur is weak, or rough, it is a corroboration that the lung is structurally altered.

During the period of tubercle formation or extension and until the latent stage is reached or established, more or less pronounced catarrh of the involved alveoli and of their supplying bronchioles is likely to be present; and may manifest inself subjectively in a slight hacking cough or in a desire to clear the throat, and under stethoscopic examination by delicate crepitations, heard as a rule at the end of inspiration, especially when the patient is made to cough or to take a deep inspiration.

In some instances the crepitations occur only once or twice after coughing, and though the cough or deep inspirations are repeated, the crepitations are not heard again until several hours later. It is therefore best to auscultate for crepitation in suspected areas in the beginning of the chest examination, and before we cause the patient to take deep breaths with a view of noting the expansion of the chest, etc.

In the ordinary circumscribed form of the disease these auscultatory phenomena are limited to particular areas, usually the apex.

Even at this early period both upper lobes may be the seat of tubercles, and simple comparison of symetrical areas is at times unreliable if similarity of the respiratory murmur is to be made the basis for an opinion.

From these physical changes, even though they are slight, if carefully observed, and their circumscribed character is evident, it is perfectly proper to infer that the particular lung portion to which they are confined is the seat of pathological alteration. The question as to its nature is then a matter of further consideration, in which we should, as a rule, have no great difficulty in coming to a right conclusion.

Into this consideration enter more partcularly the presence of a locality in the lung which gives evidence of more or less dullness on percussion, and more decided auscultatory phenomena, which may be an older deposit from which extension is taking place, and if such a spot is found in an upper lobe, and especially if there we get evidence of decided rales, or of a soft blowing character of the expiration, no matter how small the area, the theory of tuberculosis is greatly strengthened.

If the patient has a cough, no matter how slight, or if the cough and expectoration have preceded the general symptoms, especially if the expectoration should have been bloody at one or more times, or if there is a history of pleurisy, this weighs greatly towards the diagnosis of tuberculosis.

If with or without such evidence of an old lesion and of cough, the patient's temperature shows slight elevations, or if the temperature is increased by moderate exercise, if he is losing in weight and strength, we suspect tuberculosis, unless the contrary is proven.

A history of predisposition by reason of heredity or by reason of a mode of life and environment or previous disease that diminished the patient's vigor, or a history of known exposure, add to the evidence very greatly, and with these questions considered we can in many cases make a clinical diagnosis that is ample and sufficient, especially if we exclude certain other affections, and they are not many. Amongst those we should more particularly think of, are chlorosis, leukaemia, syphilis, diabetis mellitus, endo-carditis, chronic inflammation of the abdominal viscera, suppuration, etc. In many of these affections, however, there are no physical symptoms of any sort, on the part of the lungs. Acute or ulcerative endocarditis will reveal itself by an examination of the heart, diabetes by examination of the urine, chronic gastro-intestinal affections are not attended by fever, at least not by that daily rise which we see in this stage, and if pus should be present in some hidden locality, as for instance in the female pelvis, the liver or the kidneys, there are usually other local symptoms that point the way. Syphilis may, however, keep us in suspense in those cases where there are no cutaneous lesions and in which the patient denies its contraction. Even in the last stages of osseous lesions fever may be present, and though rare, there may also be physical evidence in the lung of syphilitic gumma. In such instances it may be necessary to resort to anti-syphilitic treatment, or to make a tuberculin test to clear the diagnosis.

Those who have the ability and facility for blood examinations can settle the question of chlorosis and leukaemia microscopically, otherwise, and in the absence of other strong evidence of tuberculosis, such cases should also be tested with tuberculin.

The rare cases of actino-mycosis and echinococcus of the lung may for a time leave the diagnosis in doubt, and the like is true of tumors of the chest, including aneurism; but the physical evidence is usually not confined to the upper lobe.

Cases of actino-mycosis have been claimed to react to tuberculin, but in any other of the affections enumerated the tuberculin test will be of great aid in coming to a correct conclusion, when the diagnosis is obscure. The valvular affections of the heart with which there are pulmonary infarctions, brown induration, or diffused catarrh, should, as a rule, be readily distinguished, and although in some instances the lung symptoms may cause us to think of tuberculosis, the heart affection is usually so well characterized that only when we suspect the co-existence of tuberculosis, a tuberculin test will be necessary. These, as also the chronic non-tubercular affections of the lungs, especially chronic bronchitis, chronic broncho-pneumonia, and the interstitial pneumonias due to prolonged inhalation of mineral or metallic dust, etc., require differentiation from phthisis rather than from the early stage of tuberculosis.

TUBERCULAR PNEUMONIA.

Pulmonary tuberculosis may assume a pneumonic type in its early eruptive period, when, as a result of a very dense eruption, the peripheral inflammation becomes confluent. In cases that give no other evidence of tuberculosis, and when an entire lobe is involved, the symptoms and the physical signs may resemble croupous pneumonia very closely, there being often an abrupt onset with or without chill and with high fever, and the cough and expectoration may be the same, even to the occurrence of rusty sputum. Pleurisy may occur early either confined to the involved area or extending to the remainder of the pleural sac. The pleurisy is usually due to the formation of tubercles in the parietal layer, and contrary to non-tubercular pleurisy the friction sound is soft and resembles fine crepitation; it is not increased by pressure, and is not often accompanied with a sharp stich-like pain. This delicate pleural crepitation may aid in diagnosing the nature of the pneumonia.

Cases occur, however, in which the consolidation is not well marked, and in which the pleural pain is more prominent. The percussion change may then leave us in doubt, as to the actual presence of pneumonia, and may suggest a fibrinous exudate of the pleura only.

In favor of the tubercular nature of the affection speak the location of the process, when it occurs in an upper lobe; also a prodromal stage of slight fever and general indisposition, and perhaps of a hacking cough. The evidence of a tubercular character becomes stronger, if there is no rusty sputum and the croupous form becomes practically eliminated from consideration after the first week, when the termination by crisis has not occurred. The catarrhal form of pneumonia being as a rule secondary to acute or chronic inflammation of the smaller bronchi and none such having preceded the onset; the sharp exacerbations of fever coinciding with extension to other lobules, and the occurrence of scattered foci in both lungs, having been missed, its consideration is also no longer tenable.

Cases, however, occur in which the diagnosis, while leaning to one or other forms of pneumonias, or perhaps only to pleurisy, remains in doubt until the occurrence of hectic fever, night-sweats and other evidence of tissue disintegration within the involved area, or finally with the advent of tubercle bacilli in the sputum, the true diagnosis is established. In pure tubercular pneumonia the temperature curve, if closely observed, may also throw light upon the nature of the pneumonia. In the croupous form it is usually continued with but one maximum, and that occurs towards evening, and with the termination of the disease in resolution, its quick return to the normal and the occurrence of a rapid convalescence is characteristic in typical cases.

While the onset may be equally acute in the catarrhal or bronchopneumonic type, as well as with the pneumonia that occurs with influenza, the fever shows a more remittent type and subsides sooner, if no new lung becomes involved, or there are sharp exacerbations with extension to other lobules.

Contrary to such a course, we usually note in tubercular pneumonia that the maxima occur irregularly and at times early in the forenoon, and while the fever is first continued, it soon becomes distinctly hectic, when the rise is likely to occur with a chill or chilly sensations.

In the pneumonia due to influenza infection we have at the earliest period of expectoration the presence of the influenza bacillus, and often in addition a diffused bronchial catarrh.

Unless an early differentiation was possible, further doubt may occur in those rare instances of pneumonia in which there is either delayed resolution or termination in abscess. With simple delayed resolution the fever subsides and the patient's general condition improves, but with abscess formation in any form of pneumonia the fever behaves very much like it does when in the tubercular disease caseous softening and cavity formation occur. The rarity of such a termination in non-tubercular pneumonias, the usual location of the seat of the disease in a lower lobe, and the previous family, personal and present clinical history will, however, enable a correct appreciation of the cause of the symptoms before the microscopical examination of the sputum, or its copious purulent discharge with the rupture of the abscess, settle all further doubts.

ACUTE MILIARY TUBERCULOSIS.

The eruption of miliary tubercles throughout both lungs, is as a rule only a part, although the most prominent one, of a general infection through the blood.

Its recognition is greatly facilitated, when it occurs in the course of other manifest tubercular processes which suggest the correct interpretation of the acute symptoms. In the far advanced stage of phthisis, however, such a general infection may be entirely overlooked, because the then often present pneumonic complications and the otherwise complex symptomatology may obscure its symptoms.

The greatest difficulty in diagnosis occurs when the symptoms appear in the midst of apparently good health. Having no pathognomonic signs, at least not in its earlier period, the disease is extremely likely to be diagnosed as an irregular form of typhoid fever, and such errors have occurred to the best diagnosticians, and were at times only discovered at the autopsy. The occurrence of such mistakes we can readily understand, when we examine some of the reported clinical histories, which show that although occurring in an irregular order and form, any of the symptoms of typhoid fever may actually be present and may be variously combined. These histories include cases, in which there was a prodromal period of malaise and headache or epistaxis, and in the course of the disease appeared roseola, bleeding of the gums, diarrhoea, enlarged spleen, distended colon or abdominal tenderness, more or less delirium, etc. I have, myself, seen a case in which there had been a prodromal period of general malaise, headache and slight fever. After a decided chill, the temperature varied between 103° and 106° and soon became irregular with occasional higher maxima in the morning than in the evening. This irregularity was, however, attributed to the use of the Brand method of treatment for typhoid fever. There was an early splenic enlargement, and a few spots of roseola, a dry, cracked tongue, somnolence and at times a mild delirium were also present. Diarrhoea occurred at an early period, and although the pulse varied between 120 and 150 and the respiration always exceeded 40, I felt the more justified to adhere to the theory of typhoid fever, as did also my consultant, when in the second week intestinal haemorrhage also occurred. A decided remission in the degree of fever was noted in the third week, when during three days the temperature ranged between 99° and 100°, but it quickly rose again to its former height, and soon assumed a distinctly hectic type; to account for this change, we looked for complications in the form of abscess or suppuration, but none were found. The patient died between the seventh and eighth week, and the autopsy showed nothing but miliary tuberculosis of the lungs, and of the abdominal organs; but I never could quite divest myself of the belief that typhoid fever was also present in the earlier part of the illness, and that the tubercular ulcers which were found in the small intestines, were primarily of typhoid origin, upon which tubercles had become engrafted. However this may have been, this and many other similar cases that are recorded in medical literature, show the difficulties in diagnosis that may occur in actual practice.

The rare occurrence of general miliary tuberculosis as compared with typhoid fever, and in children as compared with the frequency of pneumonia and other acute infectious diseases, will, as a rule, cause us to think of the more common affections in the first place; and it is only the subsequent course and the gradual exclusion of other diseases that will call attention to its possible or probable presence. In cases where symptoms of meningitis appear early or in which there is a miliary eruption in the larynx, pharynx or choroid, an earlier diagnosis can of course be made, even when no apparent pre-existing tubercular lesions point the way.

Physical examination of the chest, when advanced phthisis is not present, may give valuable evidence, the inspiratory murmur is rough or weak, throughout both lungs, and is accompanied by evidence of alveolar catarrh, the percussion note has a full, deep, almost tympanitic character, and the catarrhal symptoms increase as the disease progresses; while the cough may become severe, paroxysmal and frequent.

Occurring in children, we naturally think of capillary bronchitis, but the onset, without preceding evidence of catarrhal inflammation of the upper air passages and larger bronchi, may help us in its exclusion. The physical examination of the chest alone is rarely conclusive for a sure diagnosis, and all the general and local symptoms, together with the history of the case, as regards predisposition and exposure to tubercular infection, must be taken into consideration.

For general miliary tuberculosis speak a scrofulous diathesis, and existing tubercular disease, and particularly preceding operations upon tubercular bones, joints and glands; the rapid onset of acute symptoms, especially the high fever and early prostration of the patient; an irregular temperature curve, or an inversed, and eventually also a hectic type, with very low subnormal registers, and profuse prespiration. Further, the absence of pneumonic consolidations, or pre-existing catarrhal disease of the air passages that could lead to lobular pneumonia; the disproportion between the frequency of the respiration, and the local physical signs; the former exceeding 40 or 50 per minute; a very rapid and weak pulse above 130 in adults; that the spleen is but moderately enlarged; the absence of roseola; the absence of diarrhoea, or, if present, that the characteristic pea soup appearance is wanting; the absence of tenderness over the right iliac fossa, or if abdominal tenderness is present, that it is not localized; and perhaps also the appearance of severe pain in the bones and joints, and finally the increasing cough and catarrhal symptoms as the disease advances. The consideration of these points will often aid greatly in coming to a probable diagnosis, and perhaps to a definite conclusion, without the actual demonstration of tubercles in the choroid or upon visible mucous membranes, or the appearance of tubercle bacilli in the sputum. The examination of the latter should, however, not be neglected, and may be rewarded by finding at least a few bacilli, especially after the centrifugal treatment of the expectorated mucus. In occasional instances tubercle bacilli have also been found in the blood, but by no means so constantly, that their absence would weigh anything in the evidence.

The Widal test, which has been added to our diagnostic resources, seems to me to be destined to greatly facilitate the diagnosis of general miliary tuberculosis, differentiating it from typhoid and other diseases, especially if the examination is made by an expert, who can distinguish between the typical reaction of typhoid fever and an atypical reaction which seems to occur in tuberculosis. As the examination does not require the presence of the patient, all that is necessary for the physician who has no cultures of typhoid bacilli, or who for other reasons cannot well make the test, is to obtain a specimen of the blood by a puncture of the tip of a finger, or the lobule of an ear, under usual aseptic precautions, to draw a few drops into a small, sterile glass tube, to seal the ends and send the specimen by mail to his nearest laboratory.

In the diagnosis of tubercular pneumonia and of acute miliary tuberculosis the tuberculin test is not applicable, because of the high and irregular fever, in the presence of which an accurate comparison for the recognition of a temperature reaction is not possible, while a local reaction in the presence of the well marked alveolar and bronchial catarrh would not reveal itself with sufficient distinctiveness to justify conclusions. Moreover, a decided reaction in such cases, beyond adding to the suffering and general symptoms of the patient, would probably injure what little prospects there might be for recovery, by its effect upon the nutrition, etc.

THE DIAGNOSIS OF THE LATENT STAGE.

In the great majority of cases in which the disease begins as a circumscribed local process, physical evidence of its presence occurs only when by the gradual enlargement of the involved area the latter amounts to an inch and a half or more, and is approaching or has actually reached the surface of the lung; it is only with the inflammatory changes that occur with new eruptions and extensions, and when these are of sufficient extent, that we are liable to have enough general disturbance to give rise to malaise, loss of appetite, and slight rises of temperature, etc., and the symptoms which I have described under the early eruptive stage, are usually preceded by a slowly extending local growth of the tubercular process from a minute deeper centre to the periphery.

This extension through the lymphatics may, however, stop at any period, or it may continue with or without intervals until the entire lobe has become involved, the limitations of which usually set a barrier to further advance, at least for a time, and the entire process may then become latent.

The organization of the inflammatory products which has been in progress from the beginning may continue thereafter until by complete encapsulation and fibroid or calcarious transformation the tubercular process has become obsolete and extinguished, constituting a cure; or until the softening, usually of the central caseous mass, takes place. The favorable termination of this stage into a relative cure appears to require many years during which some of the tubercular foci are liable to break down. I have, myself, observed cases that showed evidence of latent disease without other than the favorable fibroid changes spoken of becoming manifest, and without disturbances of the general health for periods of ten to fifteen years, when in the end with an attack of grippe, or in connection with some other acute disease, destructive changes were initiated and the apparent cure was interrupted by the advent of ulcerative phthisis.

When speaking of a latent stage I mean that either there is no peripheral growth of the tubercular process at all, or, if there is, it is so slow that it does not disturb the general health.

According to the density of the tubercle eruption and the degree of inflammatory reaction that followed, such a latent deposit, as time goes on, reveals its presence with increasing distinctness to physical examination. Palpation shows increased vocal fremitus; the percussion note becomes shorter and higher in pitch; on auscultation the inspiration is harsh, the expiration prolonged and perhaps bronchial; the involved area shrinks, and if the apex is the seat, it will invariably be found to stand lower at some point or all around in its upper limit than that on the opposite side.

To demonstrate this difference, we percuss downward from the neck, and mark the occurrence of lung resonance with a dermographic pencil, going around the entire neck. This is a valuable sign of deficient apex expansion or of its retraction, and even in the early eruptive stage a difference can often be shown to exist between the two sides. For reliable results a pleximeter and percussion hammer are indispensible, and some practice is necessary.

The sign of vibrations or fremitus of which the patient becomes conscious when speaking in a loud voice or when singing, claimed by Murat to occur in the early stage, I could demonstrate only once or twice in over a hundred examinations, not even when the patient's attention was directed to it, and but infrequently in confirmed cases of phthisis.

Unless the earlier phase of tubercle formation has been recognized, and the case has been carefully observed thereafter, the finding of such fibroid and cicatricial changes is accidental, perhaps in connection with examinations for life insurance, or with intercurrent diseases that lead to an examination of the chest, such as measles, grippe, bronchitis or typhoid fever, and in several such instances, which I now recollect, the presence of dullness and of a changed character of the respiratory murmur in the course of the febrile disease led to the erroneous theory of pneumonia of the upper lobe.

At other times the chest examination is called for because of the occurrence of haemoptysis, due to a more or less limited destructive change in a caseous nodule in the walls of, or in the periphery of, a small bronchus, but most frequently with actually beginning phthisis, and unless we appreciate these latent processes, we are liable to be surprised with the well marked structural alterations that we find.

The facts that the latent stage but rarely leads to a permanent cure, and that it is liable to be interrupted by incidental inflammations in the bronchi of the involved part, or without apparent cause, and is then followed by softening and excavation, makes its early recognition equally desirable and important, but in the absence of all symptoms and the coexistence of apparently good health, most cases will necessarily go unrecognized until the early stage of phthisis makes its appearance.

If an examination of the chest should lead to the discovery of such a deposit, there is usually no other way of determining its nature with absolute certainty, except by a tuberculin test. From its location in an apex and from the history that may be elicited a probable diagnosis can, however, be made, and the evidence that tuberculosis is present becomes strengthened if we can exclude non-tubercular interstitial pneumonic processes that may have been the result of inhalation of metallic and mineral dusts, by reason of the patient's occupation.

If we can further exclude repeated attacks of acute bronchitis that might have been complicated with catarrhal pneumonia, leaving evidence of atelectasis or atrophy of the involved lung portions, the diagnosis of a latent tubercular process is correct in almost all cases, and with or without a tuberculin test, such patients should be advised to the adoption of such measures and modes of life that are best calculated to protect them against further advance of the disease.

THE DIAGNOSIS OF THE EARLIER STAGE OF PHTHISIS.

As heretofore suggested, we should only speak of phthisis when by the softening of caseous tubercles destructive processes have been initiated. The more difficult cases to recognize are those in which the caseous foci are small, scattered or deep seated, in which physical examination of the chest may show but little or no evidence of consolidation, the foci being too small to change the percussion note, which instead gives the normal resonance of the intervening healthy lung tissue, and the like is occasionally true with auscultation, the vesicular quality of healthy lung tissue being all that can be heard.

With the softening of such caseous nodules or of deep-seated masses the patient presents a hectic type of fever; there is, as a rule, more or less cough, and while catarrh of the bronchi in one or several circumscribed areas may be found on auscultation, expectoration if present contains nothing characteristic. Such a state may continue for several weeks, or even months, with occasional increase and decrease of the symptoms, the patient loses weight and become anaemic, may have night sweats and present the symptoms of acute or sub-acute phthisis in all respects,excepting that the lung examination is negative or doubtful, and the sputum if present is scant, usually of a thick, tenacious glairy mucus, which is brought up with considerable difficulty. The more severe the general symptoms are, the more probable is it that multiple foci are softening, from which the patient is absorbing the liquefied products of disintegrated tubercular tissue. Eventually the sputum becomes increased, the cough becomes loose, there may be admixture of blood with the sputum, or haemoptysis, and elastic tissue and tubercle bacilli are finally found, but the hectic fever and deterioration of the general health continues, and the apparent evacuation of a small cavity has not brought the relief, that we see if only a single caseous deposit has broken down.

Examination of the chest, however, gives now more positive evidence —over the focus which has discharged we now hear coarse rales, or ronchi; there is frequently circumscribed pleurisy; and pneumonic centres from extending inflammation or aspirated sputum, may change the percussion note to a slightly or moderately dull character.

The advent of such pneumonic complications is often initiated with chills, and for a day or two the fever type is changed to a more continued form, if night-sweats were regularly present before, they intermit, until the more acute symptoms have again subsided.

In due time other such foci discharge, but with or without pneumonic complications, there is no actual relief, until all these smaller tubercular abscesses have been evacuated. Even then the relief may be only temporary, especially if pneumonic complications have intervened, because the pneumonic areas are also likely to caseate and to break down, perpetuating the process perhaps indefinitely, and until the patient dies of exhaustion.

During such a course, haemorrhage and pleurisy are particularly liable to occur and extension of the tubercular process to other lung portions, adjacent and to the opposite side, is the rule.

The small cavities remain moist, and auscultation shows nothing but rales and ronchi. The area over which they are heard becomes duller, and after enlargement of the cavity, or by the coalescence of several small ones, it becomes dull tympanitic when amphoric respiration also appears.

Oftener phthisis begins in connection with or through excitation by other acute diseases which involve the air passages in bronchial catarrh, or pneumonia, as we often see it with grippe; its prompt recognition may be also delayed, until the continuance or the recurrence of fever and cough,or the advent of pleurisy suggest that local complications are present. If we have omitted to make an early examination of the chest, or if the case has not been observed from the beginning of the exciting disease, we may be left in doubt as to the true cause of the physical signs.

In some cases it may require a number of days, or even weeks, until we can establish the diagnosis with a sufficient degree of certainty, that would justify us in giving the opinion that phthisis is really present, and the advice that it would imply, but in all cases we must be careful to examine again and again, make a temperature record every two hours, make frequent sputum examinations, and watch particularly for a hectic type of fever. If the latter is well expressed, and if we observe that its rise begins with a more or less pronounced chill, we can at least be certain that there is absorption of proteids going on, probably from a disintegrating focus in the lung or from a pleural exudate, if not from other forms of suppuration.

The exciting disease having reached a period in which convalescence should be established, and symptoms on the part of the lung, especially of cough or pleural pains are continuing while the general health suffers under the accompanying fever, the strongest suspicions of beginning phthisis are justified and are further confirmed if the physical signs in the lung are observed in a circumscribed area, especially in an upper lobe.

Knowing that these physical signs may be slight, and that the locality of the tubercular deposit is not necessarily in the apex, we must, after dilligently searching the upper lobes (both anterior and posterior), also interrogate all the rest of the lungs, and the subsequent comparison of such examinations, recorded upon a diagram as I have elsewhere suggested, may help very much in the diagnosis, in which of course we take into consideration the history of the patient, and the clinical course to the present time.

Cases will occasionally show evidence of softening, but the process subsides without formation of a recognizable cavity, or even without an outward discharge of caseous detritus. In such the softening area has no doubt been very small, and the liquified material may have become absorbed, or become inspissated and then encapsulated; when the general health is again restored. At other times the softening occurs very slowly, and days or weeks of amelioration of all the general symptoms may suggest that it had either been very small in extent or that the tubercular deposit had only been congested or inflamed; but with these conclusions we need to be careful and on guard, as a renewal of the fever with a distinctly hectic type and with more decided symptoms is liable to occur.

The diagnosis may also remain in doubt in cases in which deep-seated softening of tubercles occurs with peripheral extensions from this deeper deposit. In such cases we have no marked physical signs beyond the appearance of rough inspiration and of circumscribed catarrh, which suggest tubercle formation rather than caseous softening, the latter can, however, be presumed to co-exist if the fever reaches 101° or over, if it has a hectic type, if night-sweats are present, or if blood appears in the expectoration.

In most cases the first symptoms of phthisis occur when the tubercular locality shows already well marked physical changes, and though co-existing bronchial or pneumonic inflammation may in some instances cause delay, there is usually no difficulty in recognizing it when the result of physical examination is not obscured, or made doubtful by general bronchitis or acute pneumonia.

In the differential diagnosis of the earlier stages of phthisis, from other disease, we may first consider such in which the lungs show no evidence of disease, being especially suppuration in other parts or organs, and malaria.

In most cases of chronic or acute suppuration this is accompanied by subjective symptoms that direct attention to the organ or locality involved. I have, however, seen a patient whose case was very perplexing for several weeks, during which I failed to locate the source of a distinctly hectic type of fever, with loss of appetite and emaciation, that had continued for over three weeks before she came under my notice.

The patient's lungs gave no evidence of disease, she denied ever having had any pelvic disease, there was no abdominal tenderness, her menstruation was normal, and yet when, as a last resort, I examined the genitals, I found a fluctuating mass in connection with the left broad ligament to the side and posterior to the retroflexed uterus, which proved to be the cause of the hectic fever.

Malaria deserves more consideration, not because of the difficulty in its differentiation, but because of the great frequency with which it is accepted as the cause of the symptoms of early phthisis, especially in malarial regions. I have known of a great many cases that claimed to have been treated for it for weeks, and months, when both the presence of other symptoms and the failure of quinine should have led to its exclusion. In malarial regions there seems to be a tendency on the part of some medical men to consider almost every febrile disturbance as due to malaria, and particularly so when the fever is intermittent and its onset occurs with a chill. Such a fever is particularly liable to be present in the stage of softening and cavity formation and in cases where there is as yet no cough, the error, if not persisted in, is perhaps pardonable.

The fact, however, that fever in phthisis does not yield to quinine or to other remedies that may be useful in malaria, or that at best it causes only a partial, and as a rule not a lasting amelioration, should certainly suggest that the diagnosis may be at fault. When, however, cough or expectoration, or both, are present, there is really no excuse for so grave a diagnostic error; and those who have the advantage of a good microscope should certainly use it for the discovery of the plasmodia and for examination of the sputum, before persisting in prescribing anti-malarial remedies, that appear to fail to do their work. A safe rule under such circumstances should seem to be, to examine the lungs.

Malaria may, however, complicate any stage of tuberculosis or phthisis, and I have seen quite a number of such cases on their first arrival at Asheville from malarial districts, when the disproportion of the chills and fever to the local lung changes, led to an examination of the blood and to the finding of plasmodia.

Among the diseases that require exclusion and in which pulmonary symptoms may also be present, are acute and chronic bronchitis, bronchitis with emphysema, syphilis of the lungs, tumors of the chest, certain forms of heart disease, and chronic pneumonias.

Acute bronchitis could not leave us long in doubt; the fever, if present, subsides in a few days, the cough, which is first dry, becomes loose certainly in the course of a week, when with the advent of expectoration the general condition improves and the patient feels well, while thereafter the cough and expectoration become rapidly less and disappear. Physical examination shows only a diffused catarrh of the bronchi, most marked and most persistent in the lower lobes.

Chronic bronchitis does not interfere with the general health of the patient, as does phthisis; it is usually not attended with fever, and a hectic character never appears unless retention of secretions should occur. Sputum is always present and available for examination, and physical examination of the chest shows no consolidation or bronchial respiration, only catarrh, especially in the lower lung portions; when complicated with emphysema, there is a loud deep percussion note and a harsh sharp inspiratory murmur, especially along the anterior borders, and in the lower lobes, where emphysema is usually most marked. Such cases pursue a slow and tedious course, extending often over many years; they are free from fever, show periods of absence and recurrence, or at least of increase and decrease of symptoms, with the seasons, weather, etc. They are, however, liable to tubercular infection, and the occurrence of fever and of marked loss in weight and strength should lead to most painstaking and renewed examinations, or eventually to a tuberculin test.

Non-tubercular chronic pneumonias, especially those induced by strepto-cocci, or influenza bacilli, which may lead to suppuration, are, however, attended with fever and other symptoms of phthisis and may be difficult to distinguish, except through sputum examination or a tuberculin test. Against the tubercular character would speak their more frequent seat in other portions than the apex.

Chronic interstitial pneumonias and chronic fibroid indurations of a non-tubercular character are comparatively rare. If really not old or obsolete tubercular process, they occur as a rule from inhaled irritants in dusty occupations, are of long duration and impair the health to a less degree than does tubercular phthisis; the fever is as a rule slight or entirely wanting—points which aid in a differential diagnosis when sputum is absent, but since tuberculosis may become engrafted upon such processes, a tuberculin test is always indicated and should be repeated at later periods, if the patient grows worse.

The differentiation of phthisis from lung syphilis may be impossible until a caseous gumma has broken down and the cavity contents appear with the expectoration. During its softening and disintegration the general symptoms are the same as when tubercular nodules or masses undergo a like change. The history is of course doubly important, and if the lung lesions are situated at the favorable site for syphilitic gumma, which usually extend from the hilus of the lung and become located in the middle portion, we must, even upon the denial of a syphilitic infection, make careful search for other syphilitic signs, especially for scars upon the genitals, in the throat and upon the skin; and for syphilitic nodes upon the shafts of bones, etc. The tuberculin test has been claimed to give reactions in syphilis, the same as in tuberculosis, but this claim requires further confirmation; the more so, since the two affections are often associated; instead, if our suspicions become strong enough, we can, of course, try iodide of potash.

In chronic heart disease with valvular insufficiency, the thereupon depending passive congestion of the lungs may cause symptoms of bronchial catarrh, and with it may appear bloody expectoration or attacks of haemoptysis. In chronic endocarditis of the right ventricle and auricle we may also have evidence of relative dullness and abnormal auscultatory phenomena over areas which are the seat of haemorrhagic infarctions. Likewise we may note slight or moderate dullness, when the pulmonary congestion in certain lung portions causes enlargement of the alveolar capillaries, sufficient to diminish the normal air space, leading to what is known as brown induration.

In either of these conditions, the heart symptoms are, however, a prominent feature, and the presence of disproportionate dispnoea on exertion in comparison with the lung affection the endocardial murmurs, and the evidence of cardiac hypertrophy or of dilatation, the absence of tubercle bacilli in the mucous or frothy sputum, the absence of fever excepting the first few days with infarctions, in which the rapid onset of the pulmonary symptoms, with dispnoea, and the seat of the infarction (usually in the lower lobe of the right and more rarely the left lung), is characteristic, and finally the previous history of the case should, as a rule, preserve us from error, and ordinarily it is only the question of associated tubercular disease that is liable to come up for more serious consideration.

But in ulcerative endocarditis, where, in addition to bronchial symptoms, fever is a marked feature, it may happen that phthisis, or even acute miliary tuberculosis, may be closely simulated, especially when the process has not as yet implicated the valves. The occurrence of chills or chilly sensations in connection with irregular fever suggest suppuration or tissue disintegration with absorption of the resulting toxic products, as we note in connection with softening and excavation in phthisis.

For ulcerative endocarditis would speak the frequently present diastolic murmur, without a history of chronic heart disease, the occurrence of embolism and of metastatic processes in distant parts, the presence of marked symptoms on the part of the nervous system, the occurrence of roseola, petechia or haemorrhagic spots upon the integument, and of albuminuria.

The Widal test being negative in these heart affections, modified or atypical in tuberculosis, and positive and typical in typhoid fever, may become a useful aid in differentiating obscure cases; in which the tuberculin test is, however, also applicable, excepting in acute endocarditis with high and irregular fever, when the reaction is liable to become obscured by the latter.

Metastatic abscesses of the lung from septic embolism originating in distant parts may by their symptoms also suggest phthisis, but their true nature and cause is not likely to escape recognition, in the presence of the primary affection, which is, as a rule, the prominent feature of the illness, and precedes the advent of pulmonary symptoms.

In the rare instances of echinococcus of the lung or of actino-mycosis, the preferable seat of the former in the right lower lobe should be thought of, as well as the opportunity the individual may have had for infection. Suppuration and outward discharge occurring, the microscopical examination will, as a rule, at least exclude tuberculosis, even if no characteristic vesicles or hooklets are found.

Actino-mycosis of the lungs is almost unknown in this country; in the thousands of cases of phthisis I have seen, not a single instance of this disease has come to my notice, and what has been said of echinococcus applies likewise to this disease, in which the characteristic ray fungus and grains will appear in the sputum when excavation and discharge into a bronchus has occurred.

THE DIAGNOSIS OF THE ADVANCED STAGES.

When in favorable instances the phthisical process is not immediately progressive and after the tubercular abscess or abscesses have become discharged, absorbed or inspissated, or after the formed cavity has become clean and dry, the case may again enter upon a quiescent stage, usually, however, not until a new eruption of tubercles has occurred through extension from the first destructive centre. The new eruption, as a rule, makes its appearance during or soon after the excavation; this may continue and extend, or it may become stationary and undergo like changes as were described with the eruptive stage.

The symptoms of this second and of subsequent eruptions are frequently obscured by those due to softening, and it is only by close watch upon the adjacent tissues and the opposite lung, that the local changes are likely to be discovered.

Unless complete and final recovery follows this early stage, renewal of symptoms, by inflammation and suppuration of cavities, by softening either in the still present remains of the old deposit, or in a more recent one, by pleurisy and pneumonia, become easier of recognition, with the past history and the more marked physical evidence of the increasing pathological alterations.

It would be useless to attempt a description of all that may occur, when with increase and decrease of local and general symptoms and corresponding ups and downs in the general health, the disease progresses continuously or at intervals, and when distant organs also become involved, and for diagnosis from now on, this is not necessary, inasmuch as the patient and his friends can make it without professional aid. The recognition of advanced lesions and of their extent enters, however into the prognosis of cases very materially, and a resume of their physical signs is given below.

The tendency to productive inflammation and the therefrom resulting fibroid indurations, distinguishes more or less clearly the fibroid and more chronic course from catarrhal phthisis, in which exudative inflammation and pneumonias due to mixed infection are more prominent features, causing a more rapid advance and earlier general decline in flesh and strength.

Toward the end, the pathological alterations become more numerous and complex and their exact recognition more difficult. In such lungs we may expect to find recent miliary tubercles and latent deposits; caseous, fibroid and other degenerations; pneumonic infiltrations; bronchial catarrh and ulcerations; softening areas; and closed cavities ready to discharge, others open, ulcerating or inflamed, with their walls breaking down, or cleaning, and still others healed and cicatrized. To exactly diagnose and locate all these associated processes during the life of the patient by physical examination is not possible.

It remains now to describe the more important methods of physical examination and the application of other methods which aid us in the diagnosis of the local pathological changes of the diseases under consideration, with most of which my readers are undoubtedly familiar.

They are, however, added for completeness, and to serve for the elucidation of the preceding pages.

INSPECTION.

More general inspection takes cognizance of the physical conformation of the entire body, but particularly of the chest as regards perfect or faulty development, phthisical habitus, pigeon breast, general nutrition, the state of the skin and of the mucous membranes, especially the color of the gums, which is said to have a diagnostic significance (being red in acute phthisis, and livid red in the chronic form). A distinct hectic flush of the cheeks is also suggestive, and if one-sided points to that side as most advanced in pulmonary disease.

In this connection I also call attention to the observation of Harrington (1) of widely dilated, but not paralyzed pupils, as an early sign of pulmonary tuberculosis. Further we note the condition of the skin, the presence or absence of pityriasis versicolor or tabesenticum, and of chloasma, the presence of enlarged cervical glands, or of scars resulting from their previous suppuration or surgical removal.

The immobility or retardation of the upper lobes, especially when marked retraction is also present, perhaps associated with a flat chest, short in its antero-posterior diameter, but of increased length from above downward, with wide and deep intercostal spaces, the stooping shoulders, wing-like scapula and convex vetebral column, a conformation usually spoken of as phthisical habitus, or a paralytic thorax, the emaciation of the chest and arms, the presence of fine transparent veins under the anaemic skin, over one or both upper lobes, when well expressed, are strongly indicative of phthisis.

In the upper lobes deficient expansion indicates diminished inflation; this may result from tubercular deposit with fibroid or caseous changes, from shrinking of the involved lung portion by excavation and subsequent retraction; in the lower lobes it would suggest pleural exudates and adhesions, emphysema or pneumo-thorax. General deficiency of expansion may also result from great muscular weakness. The sinking in, with more or less immobility of a circumscribed area, as in the supra- and infra-clavicular regions, indicates retraction due to fibroid changes or extensive excavation, or both. Circumscribed bulging and retraction, alternating with inspiration and expiraton in an ntercostal space, usually the second or third anterior, suggests recent superficial cavity.

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(1) Jour. of Tuberculosis, vol. II, p. 5.

In confirmed phthisis the diagnosis can often be made with almost unfailing certainty from inspection alone; the extent of the disease being all that it is necessary to determine by other methods.

PALPATION.

By palpation we may confirm some of the evidence derived from inspection and by it one can determine the degree with which the underlying lung conducts the vibration from the voice, and sometimes of the heart sounds to the palpating fingers or hand, also the degree of resistance to, or pain from, pressure in the intercostal spaces, the firmness or relaxation of the muscles, especially of the chest and arms.

The pectoral fremitus is increased in proportion as the air spaces in the lung are occupied or encroached upon by solids. Its marked increase in localized areas suggests tubercular and pneumonic infiltration or solid exudates, fibroid or caseous changes, fibrinous thickening of the pleura and firm adhesions, and when the anterior border of the left lung is the seat of such changes, we can often palpate the vibration from the closure of the semi-lunar valves of the pulmonary artery. For its distinct increase it is necessary that the solidification be situated superficially; that is to say, that no normal or approximately normal or emphysematous tissue lies between it and the chest wall.

In estimating the degree of fremitus we must, of course, remember that owing to the larger size of the bronchus, it is more marked in the right than in the left side; and that pleural effusions, obstruction of a large bronchus, or pneumo-thorax, greatly diminish or entirely prevent its occurrence.

The increase of the resistance that is experienced by the finger on palpation, or when it is used as a pleximeter in percussion, is sometimes very noticeable, and bespeaks solidification of the underlying tissue and particularly the presence of firm adhesions of the pleura to the chest wall, while tenderness on pressure or distinct pain elicited thereby would of course suggest pleural inflammation, or neuritis if confined to the course and distribution of an intercostal nerve.

PERCUSSION.

Appreciable differences in the percussion note occur when the consolidation has involved an area several inches in diameter, and about half of that in depth, and it must even then be located rather superficially.

Such consolidations do not occur in the eruptive period, in which the alveoli, while more or less encroached upon, are nevertheless still holding air, percussion gives no material aid in this stage excepting in the outlining of the apex, where the affected one may be found to stand a little lower in its extreme limit than the other; when practiced forcibly, deeper consolidations may be recognized.

Shortening of the percussion note, or diminution in its volume or of its pitch, occurs and becomes progressively more distinct as the air volume in the tubercular lung area is diminished, by very dense eruption of tubercles in the walls of capillary bronchi and alveoli, by organization of the cellular infiltration into connective tissue, which latter by its increase and shrinking diminishes the available air spaces, and, of course, also by caseation, when it occurs in mass.

The larger the air holding lung area, the fuller and louder becomes the note; hence in emphysema, and exquisitely in pneumo-thorax, we find the full, deep and tympanitic note to become the more pronounced the greater the area that is the seat of such a change. On the contrary, the smaller the area, the higher is the pitch, the smaller is the volume of the note and the shorter is its duration. The relative degree to which the pulmonary air space is encroached upon may be expressed by the designation of slightly dull, moderately dull, and flat, and the greater the area involved, the shorter in duration and the smaller in volume becomes the resulting note. The degree of tension of the chest wall and of the adjacent lung tissue influences the pitch of the percussion note, and in relaxed lung portions, through serous transudation, the note becomes deep and full, almost approaches a tympanitic quality, as an example for which I may mention diffuse miliary eruptions.

DULLNESS—A moderately dull note occurs in degrees of transition between the slightly dull and flat; it is most often noted in fibroid areas, with or without small cavities, and over a pleura that has become much thickened by fibrinous exudations; in the latter instance, however, the note becomes deeper and fuller by forcible percussion, while gentle percussion may give an entirely flat sound. A flat note, as we note it by percussing the thigh, means entire absence of air. Such a degree of dullness is rarely found in phthisis, but it is often exquisitely present over large exudates in the pleural sac, and fairly well expressed in larger pneumonic consolidations in fibroid shrinking and induration with obliteration of the alveoli, over large caseated areas, and large full cavities, and such as have not as yet discharged their contents. Otherwise, we observe it also over tumors of the lungs, the pleural, and of the mediastinum and naturally over the uncovered surface of the heart.

A **TYMPANITIC QUALITY** is peculiar to hollow bodies, and is therefore an important evidence of pulmonary and bronchiectatic cavities. The more circumscribed occurrence of tympany distinguishes such cavities from relaxation of the lung that occurs in miliary tuberculosis, pulmonary oedema, lobular pneumonia, etc., where a note resembling tympany may also be observed.

The thicker the solid media that cover such an air space, the less distinct is the tympany, and the more does the note become associated, or even replaced, by one of a short, dull or even flat character. Contrawise, a note that is approximately normal on gentle percussion, becomes dull or nearly flat under forcible percussion when but a small depth of air holding lung intervenes between the chest-wall and a deep seated consolidation, or solid organ. This can be normally observed by percussing over the lower border of the right lung where it overlaps the liver. Gentle percussion does not elicit tympany at all, unless the underlying air space is immediately under the percussed area, (instance precussion of the lower anterior and lateral portion of the left lung, over the stomach).

The tympanitic quality of the percussion note over a cavity becomes the less evident the more fluid the cavity contains, when tympany is present it is increased in inspiration, but becomes less marked or may even disappear when by forced inspiration the tension of the chest and of the cavity wall is greatly increased.

WINTRICH'S CHANGE IN TYMPANY depends upon the difference in the note that is elicited when percussing with the patient's mouth wide open, and again with the mouth closed. In the former case the tympanitic quality assumes a higher pitch. Of course the cavity must be in open communication with a bronchus. When this change in pitch is present it is pathognomonic of excavation. In large superficial cavities with smooth, firm walls the tympany becomes associated with a metallic resonance.

THE CRACKED-POT RESONANCE is also indicative of cavity, and is best elicited when the walls are not very firm, and when the patient holds his open mouth close to the ear of the observer. For its production the communication with a bronchus must be rather narrow. This sign distinguishes a pulmonary cavity from bronchial dilation.

In the practice of precussion it must, of course, be borne in mind that slighter degrees of change can only be accurately determined by comparison under the same conditions of symmetrical areas, and that the note is influenced by the underlying, or even closely adjacent solid organs, due allowance being made for differences in muscular development, adipose tissue, rigidity of the chest wall, and its possible deformity, especially posterior, by spinal curvature, etc., and that the presence of vicarious emphysema may hide and obscure deeper seated fibroid and other changes to a degree, that we can only appreciate fully, when we make post mortem examinations and compare our previous records with actual findings, and finally, that altogether percussion can at best reveal only coarser pathological alterations.

AUSCULTATION.

Auscultation is by far the most delicate method of physical examination of the lungs, and usually the most reliable, when it is practiced with the necessary care.

In the diagnosis of the early eruptive period auscultation gives most important information, by the appearance of signs indicative of hyperaemia and delicate catarrhal changes in the alveoli and bronchioles, consisting of a peculiar ROUGH CHARACTER OF THE VESICULAR MURMUR, and the occurrence of fine crepitation or a sense of "stickiness" that denotes increased moisture. When such a character of the vesicular murmur is observed, and it is confined to a limited area, as an apex or upper lobe, and in the absence of compression of the lung by tumors, aneurisms or pleural exudates, and when there is no other evidence or condition that can produce active or passive hyperaemia, we can be certain, that tubercle formation is in progress in such a locality. In auscultating for it, the patient should be examined first during quiet respiration and thereafter the respiration should be deeper; comparison should then be made with the opposite lung, and, with a good stethoscope and a keen sense of hearing, its appreciation is not difficult. The sense of "stickiness" or the occurrence of fine crepitation is more particularly brought out on deeper breathing, and with coughing; often, however, it disappears quickly, and may then not recur for several hours. With increased hyperaemia the catarrh is more marked, the crepitations occur persistently with each inspiration, and especially in the latter part, or toward the end of it. When the bronchioles are the chief seat, the crepitations occur with the first part of the inspiration; they are coarser and have more of the character of fine, moist rales, and when abundant they may more or less obscure the rough vesicular murmur spoken of.

In the established and progressive disease the occurrence of rough breathing and of crepitations are often noticeable in adjacent or distant parts, which as yet give no evidence by percussion; they usually indicate the advances of tubercle formation upon the periphery of older processes, and to the opposite lung.

More or less obstruction of the lumen of the bronchioles, by the presence of tubercles, swelling or catarrh of their mucous membrane, or by their compression and distortion, impede the air current so that the vesicular murmur appears only after the first third or half of the inspiratory act, when the intra-pulmonary air pressure has become sufficient to overcome the obstruction, and in areas where other bronchioles are comparatively or entirely free, the inspiratory murmur becomes thus divided, causing the well known interrupted character which is a valuable and often an early auscultatory sign of tubercular process in the areas where it is heard.

Harsh inspiration—With the advent of consolidation sufficient to be appreciable by percussion, this rough vesicular character gradually disappears and gives place to a more harsh or sharp quality in proportion as the air-holding alveoli are diminished by obliteration or by compression and atrophy. About this time the expiration becomes also audible, harsh, or even bronchial, and prolonged.

Weak respiration, if it is noted in one lung or a portion of a lung, suggests, as a rule, a correspondingly extensive tubercular infiltration. It is often present as one of the early signs, and indicates that but little air reaches the alveoli, on account of swelling or extensive tuberculization of mucous membranes of the bronchioles, and of the alveolar walls. It may, however, also occur by compression of a large bronchus in the area which it supplies, by enlarged glands, tumors, aneurisms, and temporarily by obstruction with tenacious mucus; and when it is found in the lower lobes in the course of phthisis, it is often due to thickened pleura and fibro-plastic exudates, although in the latter instance a stronger quality of the respiratory murmur appears when we make the patient take a deep breath.

The respiration is normally observed to be weak or less distinct in both lungs (except perhaps in the axillary line) in very fat persons, and also over large female breasts; we also note it to be weak in pleurisy with much pain when the patient avoids deeper breathing on account of it.

Bronchial respiration is not, as a rule, so well expressed in tuberculosis, or in the latter stages of phthisis, as we find it in the stage of hepatization of croupous pneumonia; and it is never present in the early eruptive stage unless in the pneumonic form.

In older tubercular deposits that are undergoing fibroid or caseous changes, it appears first with expiration and only when areas of several inches in diameter, or of considerable thickness, have become consolidated to a degree that the alveoli and bronchioles contain little or no air, does the inspiration also assume a bronchial character. We therefore find bronchial respiration more frequently over dense fibroid areas, over large caseous mases, and over still closed cavities or such that are full of secretions, over a lung portion that is compressed by a tumor, aneurism, pleural and pericardial exudate, and by air in pneumo-thorax.

Extreme upward pressure of the diaphragm on account of abdominal tumors, ascites and meteorism may also produce it. A bronchial or oftener a gently blowing character may be observed in the upper part of the chest, over a normal lung when the patient forces his expiration and prolongs it by muscular efforts with a partially closed glottis; to justify the inference of a pathological significance, it must occur in ordinary respiration, when, of course, it is intensified by forced breathing.

Amphoric respiration—The space where we observe amphoric respiration usually coincides with that where tympany is also present; but a dull tympanitic note may be observed over cavities that are not large enough to give an amphoric quality, when the respiration will have a bronchial, or more or less blowing character.

It occurs typically in large, open cavities with firm walls, and if they are seated in consolidated areas, the amphoric quality may be transmitted to an extent of an inch or more, losing, however, in distinctness, as compared with the excavated area. In open pneumo-thorax, when the communication is free, an amphoric murmur may also be heard.

Rales, ronchi and gurgling—I have already referred to the fine crepitations or sense of stickiness which occurs with increased moisture in the alveoli, and of the slightly coarser crepitant rales in the terminal bronchi. These, as well as other rales, indicate the presence of increased secretions, but differ in character according to to the amount and consistency of the fluid which is set in motion by the respiratory current, and by the size of the space (alveoli, bronchi or cavities) in which they are produced.

The fine crepitations spoken of should, however, be distinguished from crepitations that occur when the pleural surface is the seat of miliary or sub-miliary tubercles, and which result from friction of the uneven pleural surfaces, or from the presence of increased moisture upon them. This differentiation is quite often difficult and may be impossible for one that has not become familiar with the difference between the two. Contrary to the ordinary pleuritic friction sound, it is not increased by pressure, it is not usually accompanied with pleuritic pain, and, instead of a distinct harsh rubbing sound of some duration, it is more of a delicate dry crackling, and appears nearer to the ear, as do crepitations in the alveoli and bronchioles.

Apart from the crepitant rales, we speak of moist rales as small, medium and large sized, according as we infer them to be produced in correspondingly sized bronchi, and of a "mucous click," when but a single rale is heard, which is at times the case at the end of inspiration. When larger quantities of fluid secretions are agitated with the inspiratory air current, as is likely to occur in secreting cavities, there results a sort of churning or gurgling, which we call gurgling rales.

When rales occur in large superficial cavities with firm walls, and the secretions are tenacious, a metallic note is added, and they are therefore spoken of as metallic rales; they are usually more of a dry character.

Tenacious, mucous secretions when set in motion do not convey the sense of moisture, but rather of a sharp crackling of a more or less metallic timbre, and if by such secretions or through distortion, compression or swelling the calibre of a bronchial tube is narrowed in its course, there occur more prolonged sounds of a musical quality, which are recognized as ronchi; they are called sonorous, when the note is deep or purring; sibilant, when the sound is higher pitched and of a fine whistling character. The former occur only in the larger bronchi ,and are liable to be transmitted over the entire side, or even to the opposite side of the chest. The sibilant ronchi vary in size and quality of pitch according to the varying calibre of the smaller bronchial tubes in which they are produced. Another sort of ronchi that convey the sense of creaking, like new leather, occur frequently over destructive areas, especially multiple small cavities; any of the ronchi are liable to be heard with expiration as well as inspiration, moist rales, on the contrary, are heard, as a rule, only with inspiration, except the mucous clicking, which, when produced in a cavity, may occur at any stage of the respiratory act.

While rales and ronchi have in themselves no direct significance as to the presence of tuberculosis, but denote only the presence of increased secretions, and in a measure the fluidity or tenaciousness of the same, or the partial obstruction of a bronchus, they become decidedly suggestive when, after excluding other possible local causes, they are heard only in a circumscribed area, and the more so if this area is an upper lobe.

SOURCES OF ERROR IN PHYSICAL EXAMINATION.

In an article written for practitioners it should hardly be necessary to call attention to sources of error in percussion and auscultation, but I have so frequently noted faulty methods on the part of some of my medical confreres that I must call attention to one or two. To say nothing of the necessity of comparing gentle and deep percussion, with like localities on the opposite side, of the need of close application of the finger or pleximeter to the chest, and of an equal elastic stroke with the percussing finger or hammer, I have noticed that some physicians compare regardless of inspiration or expiration, or whether precussing over a rib or an intercostal space. Such methods are absolutely unreliable unless the dullness is very well marked, and for careful work these sources of error must be avoided.

Again in auscultation, a patient may cause the appearance of harsh or sharp inspiration by a quick, inspiratory effort, or the inspiration and expiration may appear bronchial if the patient breathes forcibly with the glottis partially closed, when in either case, in proper breathing the respiratory sounds are normal. Particular notice should be taken that the patient does not force and prolong the expiration voluntarily; should we fail to note such faulty methods on the patient's part, we are liable to draw wrong conclusions.

Many physicians still prefer to dispense with pleximeters, percussion hammers and stethoscopes upon the claims that instead the fingers and the naked ear will do as well, and that one has the advantage of having them always ready. Excepting instances where we desire to carefully outline areas or organs, I agree to the use of the fingers as pleximeter and hammer, especially when accustomed to their use, but, for reliable auscultation, I am absolutely convinced that the best work can only be done with a good stethoscope, directly applied to the skin. As for the disadvantage of having to carry such an instrument we must accept it, in the interest of accuracy, the same as we accept the disadvantage of our vision being not microscopic, when we need to avail ourselves of the use of a microscope.

THE TUBERCULIN TEST.

In the diagnosis of a doubtful case a judicious application of the tuberculin test promises to simplify the correct diagnosis very much indeed, and if its general adoption and use by the profession will bear out the experience of those that have heretofore studied it, it will certainly save us a great deal of delay and uncertainty and will enable us to give our opinions positively, where heretofore we had to admit an element of more or less doubt.

This test should be the particular resource of general practitioners, who, on account of their manifold duties in all branches of medical practice, cannot have the necessary familiarity with physical examination of the lungs that is required to recognize and interpret the more delicate changes found in the early stages of tubercle eruption and beginning phthisis, and it is to be hoped that with the assurance of its perfect safety by all those who have heretofore frequently employed it, the ability of an early diagnosis of the disease will in the future no longer belong to the trained specialist alone.

The apparent reasons for the heretofore observed reluctance of the profession at large, to avail itself of so valuable an aid in doubtful cases, I believe to be a certain fear, that the test will do harm by causing tuberculosis where none had previously existed, or by favoring extension of the disease; further, because its reliability has been questioned, and no doubt also, because in many instances the tuberculin was not at hand, and when it was obtainable the proper dose and technique were not familiar to the physician.

The fear of doing harm had its origin with the unfavorable theapeutic results which followed the use of the remedy, when it was employed in advanced cases of phthisis in purposely large enough doses to cause decided local and general reactions; and there is no doubt that many such cases were made worse, not because the remedy could in any way cause tuberculosis, but because excessive reactions seriously impaired the patient's general health, and the severe local reactions in the vicinity of advanced lesions caused unduly severe and prolonged congestion and oedema, under which the adjacent tissues become more liable to inflammations from co-existing pathogenic bacteria, especially the pneumococci and other pus germs.

Against such therapeutic use of the remedy, I cautioned the profession shortly after my return home from Berlin in 1891, and on all proper occasions since, in my writings on the subject. These warnings, in which many other observers have joined me, have had a salutary effect, and the therapeutic use of tuberculin in doses that cause decided reaction is no longer countenanced by those who employ it.

For diagnosis, however, the reaction is purposely induced, and with the experience that has been had from reactions in advanced cases, I would not recommend that such be subjected to a tuberculin test, especially not, since the diagnosis offers no difficulty, and can as a rule be established beyond a doubt by physical examination of the chest and the microscopical examination of the sputum. In my large experience, both in the therapeutic and diagnostic use of tuberculin, I have never seen any reason to regret its employment; and even when in advanced cases, the remedy was used therapeutically with avoidance of decided reactions, there has been no undesirable effect whatever.

For diagnosis, I employ the test only in the stage of tubercle eruption, sometimes in the latent stage that follows it, and in the early stage of phthisis when the evidence is doubtful, and when, from the clinical symptoms and physical examination, or both, other affections that may simulate the disease cannot be excluded with at least a fair degree of certainty.

Employment of the test in such cases I know to be perfectly safe, and, as I have already stated, there is really no occasion for resorting to it in others. Some of the advocates of the tuberculin test claim to employ it in every case of phthisis that comes under their care, and say they have seen no unfavorable result; granting the safety even in advanced cases, I would, however, still object to its employment when other methods of diagnosis are sufficient, because of the resulting fever and general symptoms which are at least of a temporary disadvantage to the patient.

As to the absolute reliability of the test, this question is by no means finally settled, and I rather believe there will be occasional failures in medical as well as in veterinary practice. The fact that patients suffering from other diseases than tuberculosis, notably, syphilis, actino-mycosis and leprosy, are said to give reactions to tuberculin, must be borne in mind, and although there may be associated, latent or obscure tubercular processes, the close relationship that exists in the micro-organisms of these affections with the bacillus of tuberculosis may perhaps explain the reactions in cases, when tuberculosis is really absent.

No satisfactory explanation has been given to account for the fact that tubercular patients are more sensitive to the action of tuberculin than others; their sensitiveness is apparently greatest in the early stage, in which so small a dose as half a milligram may cause a decided rise of temperature. In more advanced stages of confirmed phthisis this sensitiveness seems less pronounced and full test doses may then be required to cause a decided reaction.

This increasing toleration, as the disease advances, is however not present in every instance; some patients reacting to very small doses, even in the far advanced stage, but even in those that have become more tolerant, a reaction occurs as a rule from smaller doses than are required to produce it in non-tubercular subjects.

As to the latter, there is also a considerable difference in the degree of susceptibility; I have seen persons whom I had every reason to believe free from tuberculosis to react to a few milligrams, while in other instances 50 milligrams produced no effect.

These experiences impair in a measure the dependence that we can place upon a tuberculin test, and I trust that a more general use of it, and of other culture products, for diagnosis, will supply the needed elucidation of all that is as yet obscure in their use. Enough work has, however, been done to justify us in having confidence sufficient to go further,—in my own hands the tuberculin test has been entirely satisfactory, and the therapeutic use of tuberculin and of its subsequent modifications has given me results that are unmistakably in favor of their employment.

Tuberculin for diagnostic purposes can now be readily procurred and has the advantage of keeping indefinitely. I have still in my possession several specimens that were made in Germany in 1890, and others produced in my laboratory five years ago, all of which appear as reliable as they were in the first place. The preparation has also become cheap and a cubic centimeter, which is sufficient to test from fifty to a hundred cases, can be had for the trifling sum of twenty-five cents. This permanency and cheapness enables any physician liable to meet cases of tuberculosis, to keep it on hand, so that no time need to be lost in making a test. Having purchased a cubic centimeter of the tuberculin, a part of it can be made into a ten per cent. solution using for a diluent boiled, distilled, or clear spring water which contains two-fifths of one per cent. of carbolic acid. This solution also keeps indefinitely and from it a one per cent. solution should be made at the time we want to use it.

If the physican has no means of measuring in the metric system, a clean, ordinary hypodermic syringe will answer the purpose; each minim of the one per cent. solution is equal to two-thirds of one milligram of tuberculin, and, knowing this, it is easy enough to approximate the doses when they are given in the metric system. If, for instance, we want to inject five milligrams, we would give seven and one-half minims of the one per cent. solution of tuberculin; if only one milligram, we would give one and one-half minims, the slight fractions can be disregarded as of no practical importance.

For the correct interpretation of the test in private practice, we must depend largely, if not entirely, upon the general reaction, particularly the rise of temperature that follows the injection, usually in from eight to sixteen hours. The local reaction is at times transient, and to recognize it in the lung, requires great practice and skill in physical examination.

It is therefore necessary that we know the course of the temperature and its variation in the patient to be tested, and to have a record for one or two days preceding the test. Most patients are intelligent enough to measure their temperatures, or some member of the family can be taught to do this; an observation every two or three hours is necessary.

Having decided to make the test, and having carefully prepared a record of the temperature, the injection is made in some locality, where the skin is thick and loose, into the subcutaenous cellular tisue, and the temperature is measured for another 24 or 36 hours.

Professor Koch and others have stated that to really exclude tuberculosis, a patient must show no reaction to a single full test dose of twenty milligrams (thirty minims of the one per cent., or three minims of the ten per cent. solution) and some authors invariably give this dose, making a single and conclusive test. Inasmuch, however, as some persons are highly sensitive and react even to so small a dose as half a milligram, and fearing that the large test dose of twenty milligrams might produce an excessive reaction with possible injury to the patient, the majority of those who have written on the subject within the last few years recommend smaller doses, or increase them until the maximum dose is reached.

No unanimity exists as yet as to the mode of application, or even as to the necessary maximum dose, the latter is variously estimated from one to twenty milligrams, some give first one, then three, and then six milligrams, and draw their conclusions from the effectiveness of the latter; others give one, two, four, eight, sixteen and finally thirty-two milligrams, while still others give a single dose of five or ten milligrams, and apparently these various modes of procedure have given satisfaction to their respective authors.

In my own experience I have found that the degree of the reaction does not, as a rule, stand in relation to the size of the dose, and that a reaction occurring from five or ten milligrams is not materially increased in a sensitive patient over what it is from one or two milligrams.

To be reasonably certain of the result, the reaction must be well expressed, and although in favor of a conservative course, I do not think it necessary to lose too much time in making the test, and of late, I usually give five milligrams (seven and a half minims of the one per cent. solution) for the first dose, and this failing, I give, a week later, a full test dose of fifteen or twenty milligrams (two and a half or three minims of the ten per cent. solution) to an adult, and adjust the doses for children according to their size and weight, as we do with other remedies.

A gradual test is, however, not as complete and conclusive as would be the case, if a single full dose had been given in the first place, and owing to the toleration that patients acquire, the beginning of the test with minute initial doses of half or one milligram and increasing to three, five, ten, fifteen and finally twenty milligrams makes the result doubtful if no decided reaction follows their use. In other words, if we test a case of tuberculosis and administer tuberculin in gradually increasing doses, we may fail to obtain a reaction because of the toleration that obtains under such a slow increase (a practice which is purposely followed when giving tuberculin for therapeutic purposes).

Most early stage cases react to five milligrams, while some of them would no doubt react to less, there is no danger, nor even higher fever, or otherwise increased discomfort from this dose, as compared with a smaller one. No reaction occurring, it is best to wait a week, and then try a larger or a maximum dose.

Some advanced cases lose their sensitiveness to tuberculin to a certain degree, no doubt because they have acquired a slight degree of toleration or immunity through the absorption of like toxins from their tubercular lesions; and very old cases of stationary fibroid phthisis show no reaction even to ordinarily full test doses. The sensitiveness of tubercular subjects is supposed to be due to a specific irritating effect of the injected toxin upon tubercular tissue, causing more or less increase of vascularity of the tissues in which the tubercles are situated, thereby increasing the absorption of toxins from the tubercles. This is, however, only a theory, that is not susceptible to actual proof; the partial support it has is, that in lupus and in other tubercular lesions which are accessible to direct inspection, such a congestion or hyperaemia can actually be observed, and the local reaction in the lung indicates that the parts are more hyperaemic during a reaction than they were before, and after the reaction has subsided. But as to the absorption of toxins from such hyperaemic tissues we can only speculate.

The reaction may be general or only local, usually it is both, and occurs as a rule in from eight to sixteen hours after the injection, lasting from a few hours to twenty hours and exceptionally longer. The time of its occurrence is influenced by the natural daily temperature variations, and when given late in the evening it is, as a rule, not as prompt in its occurrence, as we find when we give it early in the morning. I prefer to give the injection between seven and eight o'clock in the morning, thus having from twelve to sixteen hours before the patient goes to sleep to watch for its effect. Injections may also be given at ten o'clock at night, when the reaction will be observed the following day.

There are, however, instances in which the reaction occurs in five or six hours, others in which its duration is very short, amounting to not more than two or three hours; and an evening test may thus be followed by a reaction, which, should the patient sleep during the occurrence, would be overlooked. On the other hand, there are those in which the reaction is delayed, and occur only after twenty to thirty hours, and if short in its duration it may again coincide with sleep when the dose is given early in the morning. Such observations are, however, exceptional, but should nevertheless be thought of, especially when unexpected or contradictory results apparently confront us.

The chief symptom of a general reaction is fever, and to be conclusive the temperature rise over and above that which occurred on the previous day should be at least 2° F. to a full test dose. The fever may be initiated with a distinct chill or chilly sensation, or it may rise gradually without chill; with it there is, as a rule, a tired feeling, sometimes decided aching of the head, back and of the extremities, very similar to that which we are accustomed to observe with the onset of acute infectious diseases, and, like in those, there may be nausea and vomiting. The occurrence of diarrhoea, however, suggests tuberculosis of the intestine. Often there is a slight hacking cough when prior to the test none was present, or the cough and expectoration are increased. If small, open surfaces or ulcers are present they secrete more freely, and tubercle bacilli may thus be found, under the reaction, for the first time. These general symptoms disappear in the course of the next twelve to twenty-four hours.

Local reactions may also be noted, but cannot always be accurately observed; in the lung we find an increase of the auscultatory phenomena, due to hyperaemia in the tubercular area. In localities where we previously could detect no change from the normal, the inspiratory murmur may become rough; in previously rough areas we are apt to find fine crepitant rales, and if heretofore only transient, they become more persistent.

Tubercular glands accessible to the touch, become more swollen and tender, tubercular joints may also show increase in swelling, and with it there may be increased tenderness or spontaneous pain. It is the same in the larynx and other localities the seat of tubercles, all showing the stimulating effect of increased vascularity. I have often noticed such effects in localities where prior to the test nothing wrong was suspected, especially in the larynx, indicating the early beginning of tubercular disease at a time when ordinary examination gave as yet no evidence whatever, and in such cases the tuberculin reaction becomes a most interesting study.

Encapsulated caseous, and fibroid tubercles, whether in the lungs or elsewhere, show no influence, and in partially encapsulated and fibroid areas, the reaction may appear only after larger doses than those applied in a test are reached. The tuberculin test is contra-indicated in cases that by persistent headache and other premonitary symptoms justify suspicion of tuberculosis of the nerve centres and meninges, and in all advanced cases, especially those where there is extensive caseous softening with hectic fever. After it is applied the general conduct of the patient and his mode of life and diet should be about the same as it was during the preliminary observations of the temperature, but it is not necessary to keep the patient confined to the bed or even to the house. All that we should care for is, that the condition before and during the test should be practically the same, and that temperature rises and local hyperaemia in the lung may not be induced from incidental causes.

In its application in general practice, the physician must depend largely upon the general reaction, especially the fever; but those who are in a position to do so, should not neglect to examine the lungs and larynx or other suspected parts if they can see the patient within twenty-four hours after giving the test dose.

If the test is positive, tuberculosis may be accepted as being present somewhere in the tissues of the individual, and we can be the more certain if we can at the same time exclude the presence of syphilis, actino-mycosis and leprosy.

The diagnosis is the more certain the smaller the dose that produced the reaction; and a well marked and accurately observed local reaction justifies the diagnosis even if the general reaction including the fever was slight or doubtful.

If, however, we apply the test in a case in which the preponderance of evidence is against tuberculosis, and if the patient responds only to an approximately full test dose, and only with a general reaction, I should not care to make a diagnosis of tuberculosis because we know that there are non-tubercular persons that are comparatively more sensitive to the toxins of the tubercle bacillus than are others.

If the reaction has failed, and we know that we have used a reliable prepartion of tuberculin, if the case tested is not an advanced case of phthisis in which we could presume that toleration has been established, and if we are sure that the general or local reaction was not overlooked, we are justified in excluding tuberculosis.

The tuberculin test is also applicable and deserves to be employed with a view of determining the result of treatment, when from whatever method we have pursued, we believe our patient to have recovered. In many such cases it will be found that the patient reacts promptly and that the apparent cure is after all nothing but a latent stage which is liable to show new activity in the future, when by an attack of grippe, bronchitis, or other causes, new inflammation is set up in the lung, or when the patient returns to his previous mode of life, occupation and climatic environment.

It will be observed that I have devoted considerable space to the tuberculin test. I have done this in the hope that a full consideration of the subject will enable and induce the general practitioners to regularly employ it in their doubtful cases, and I close it with again giving the assurance that its careful application will do no harm to the tubercular subject, and will have no influence of any sort upon the present or future health of those who are free from the disease.

THE WIDAL TEST.

As a further aid in diagnosis the Widal test for typhoid fever may eventually concur with or take the place of the tuberculin test with the advantage, that it takes much shorter time and does not require the presence of the patient nor the preliminary or post injection observations.

In a communication on this subject (1) my son, Dr. S. H. von Ruck, reported some very interesting studies made by him in the Laboratory of the Winyah Sanitarium in the summer and fall of 1897; and although but a limited number of cases were examined the uniform occurrence of an atypical (modified) reaction in tubercular patients, and which does not occur in healthy subjects, caused him to suggest the test for the diagnosis of tuberculosis.

The disadvantage, however, of having to maintain typhoid bacilli cultures, or, in their absence, the necessity of having to send the blood specimen to a distance, must necessarily limit its application, and of course further confirmation of his work by testing a large number of cases is required.

SPIROMETRY AND PNEUMATOMETRY.

Another aid in diagnosis by physical means we have in the use of the spirometer and pneumatometer, the latter consisting of a U-shaped glass tube partially filled with metallic mercury with an attached scale.

The spirometer measures the vital capacity of the lungs and when marked deviations occur from the minimum for the height of stature and sex, they may be indicative of pulmonary disease.

If we have instructed our patients sufficiently in its use; and exclude errors possibly due to tight dress, gaseous distension of the abdomen, etc., while not amounting to anything absolute, it is nevertheless a valuable aid; and I have converted the scale which von Ziemssen gives in cubic centimeters into cubic inches, as spirometers in this country are usually graduated in that way.

Any considerable reduction from the minimum quantities for men and for women for their respective heights, is in proportion to such reduction an aid in diagnosis.

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(1) Jour. of Tuberculosis, vol. I, p. 179.

MINIMUM VITAL CAPACITY.

For Height of, Inches.	In Men, Cubic Inches.	In Women, Cubic Inches.
54	165	140
55	168	142.5
56	171	145
57	174	147.5
58	177	150
59	180	152.5
60	183	155
61	186	157.5
62	189	160
63	192	162.5
64	195	165
65	198	167.5
66	201	170
67	204	172.5
68	207	175
69	210	177.5
70	213	180
71	216	182.5
72	219	185

A good spirometer is, however, essential, and the one devised by Dr. Charles Denison, of Denver, is the best, and least likely to get out of order, of any with which I am acquainted.

Its use is also a certain aid in estimating the progress of a patient toward recovery or otherwise; at the same time we must not forget, that when the first measures are made at a period in which the patient is much reduced in flesh and strength, the improvement that may result in the latter has undoubtedly an influence upon the increased values that we may note, and they need not be necessarily due to a change in the lung capacity; such increase of the vital capacity is, however, a favorable sign.

The use of the pneumatometer in diagnisis of pulmonary tuberculosis is based upon the fact that the air pressure in the lung, both in inspiration and expiration, undergoes a diminution even at an early stage of the disease.

The average inspiratory pressure in health is in men 45, and in women 25 mm. mercury, and the expiratory pressure is for men 60 and for women 35 mm. With forced inspiration this average is 70 and 60, and with forced expiration 80 and 70 mm. mercury for men and women respectively.

In pulmonary tuberculosis the inspiratory force is reduced first, and later as the disease advances the expiratory force also begins to suffer, but, as in the use of the spirometer, slight reductions have no diagnostic significance. This method of examination may also serve to control the improvement or indicate an adverse course of the disease.

Waldenburg has also pointed out that pneumatometry may aid in the differential diagnosis between tuberculosis, and chronic bronchitis and emphysema inasmuch as in tuberculosis the inspiratory force is first diminished while the expiratory force remains unimpaired, whereas in bronchitis and emphysema the expiratory force is first diminished and the inspiratory force remains unchanged and may even exceed the former.

EXAMINATION OF THE CHEST WITH X-RAYS.

Numerous contributions have already appeared with reference to the use of the X-rays in diagnosis of pulmonary affections, and there is no doubt that in some instances this method has supplied information of the nature and degree of pathological changes in the lungs that were a source of doubt or entirely obscure under other methods of examination; thus cavities that were not revealed by either percussion or auscultation have been demonstrated, in other instances consolidations, effusions, tumors aneurisms, etc., have been shown definitely as existing, and their approximate size and location were determined in instances that without this method of examination were subject to doubt and uncertainty, or were not recognized at all.

Nevertheless the diagnosis of lung affections by the use of the fluoroscope requires much pratice and an apparatus which for the present at least will confine its employment to a very limited number of practitioners and to special institutions; and I reserve myself to contribute any personal experience on this subject in the future.

MICROSCOPICAL EXAMINATION OF SPUTUM.

Selection of material—For diagnostic purposes it is important to select for examination that portion of the expectorated material which will most probably contain tubercle bacilli when present. It is found best to search for the small, yellowish, caseous particles; if none can be found, a very small drop of the most purulent appearing material should be chosen. This procedure may be greatly facilitated by examining the sputum in a shallow glass dish over a black surface. One of the small caseous particles (or a small drop of the most purulent material) is separated with needles or a small platinum loop and transferred to a cover-glass or slide and spread out in a very thin layer, by means of the needles or a small platinum spatula, or by pressing between two cover-glasses and sliding them apart; this thin layer is allowed to dry in air; the process may be hastened by gently warming over the flame.

The specimen is then fixed by quickly passing three times through the flame, being careful to not burn the preparation which is now ready for staining.

STAINING METHODS—There are two methods in common use.

(a) Fuchsin—methylene-blue:

Stain 1—3 minutes in hot cresol-fuchsin solution. (1)
Wash in water, or dilute alcohol (1:4).
Submerge 1—2 minutes in Gabbet's solution. (2)
Wash well in water.
Press between layers of filter or blotting paper.
Thoroughly dry in air, or by gentle warming.
Mount in balsam.

The tubercle bacilli are stained red. Other micro-organisms, nuclei, mucous fibres, elastic fibres, etc., are stained blue.

(b) Ehrlich's method:

Stain 10 minutes in hot analin-water-gentian-violet. (3)
Wash in water.
Submerge in dilute hydrochloric acid. (1:3)
Wash in water.

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(1)	Para-fuchsin	1.0
	Ortho-kresol	2.0
	Absolute Alcohol q. s. ad. sol.	
	Distilled Water q. s. ad	100.0
(2)	Methylene-blue	2.0
	Sulphuric Acid	25.0
	Water	100.0
(3)	Analin Oil	1.0
	Water	10.0

Shake, decant and filter. To the clear filtrate add an alcoholic solution of gentian-violet, drop by drop till the surface shows a metallic lustre.

Repeat treatment with the acid till the preparation is quite or nearly decolorized after washing in water.

Counter stain 2—3 minutes in Bismark-brown solution. (1)

Wash in water.

Press between layers of filter or blotting paper.

Dry in air, or by gently warming.

Mount in balsam.

The tubercle bacilli are stained violet. Other micro-organisms, etc., are stained brown.

SEDIMENTATION—Oftentimes a suspicious sputum may give negative results after repeated examination, and it may be necessary to resort to sedimentation or the centrifuge before tubercle bacilli are found. This may be accomplished by the following methods:

A quantity of sputum is mixed with six to eight volumes of 0.2 per cent. solution of potassium or sodium hydrate and then heated till the mucus is cut. It is then either allowed to sediment in a conical-glass or centrifuged, and the sediment examined as above. However, it should be remarked that the staining qualities of the tubercle bacilli are some times much interferred with by the cooking in alkali. To avoid this Sprengler (2) has given the following method: To 5—10 c.c. sputum is added 50—100 c.c. 2 per cent. sodium-hydrate solution and 0.5 gm. pancreatin; the whole, in a conical-glass, is placed in an incubator (35° to 40° C.) for 12 to 24 hours. In this way the sputum is digested and the tubercle bacilli together with other micro-organisms and indigestible material fall to the bottom. The high alkali percentage oftentimes interferes with the fixation of the preparation—this may be overcome by washing the sediment with water and centrifuging.

ELASTIC FIBRES may be demonstrated by taking small quantity of sputum, pressing same between two slides and examining with a low power, or as follows:

Sputum	10.0.
Potassium hydrate solution (10 per cent.)	10.0.
Mix thoroughly. Add	
Water	80.0.

Shake and place in conical glass to settle, or centrifuge.

The Weigert and Van Gieson staining methods may be utilized for the detection of elastic-fibres.

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(1) Aqueous solution of Bismark-brown.

(2) Zeitschrift f. Hygiene, 1894, XVIII, H. 2.

Differentiation—It is rarely necessary to differentiate from leprosy bacilli in sputum.

Smegma-bacilli have been found in sputum, but this is a very rare circumstance, however they may be differentiated by submerging the stained specimen in absolute alcohol for one minute, which completely decolorizes smegma-bacilli, but does not affect the stain in the tubercle bacilli. (1)

The frequent delays in diagnosis till pulmonary tuberculosis has reached an advanced stage, have led the average person to consider such a diagnosis as a death-sentence, and many physicians appreciating this, have generously withheld their true opinion, even at a period when the disease was in a comparatively early stage, fearing the depressing effect such a diagnosis might have upon the patient.

At the present time, however, when the prospect for recovery from the earlier stages has been so greatly improved, and when, even in many advanced cases, we may bring about lasting improvement, with a comfortable state of health, this hopeless attitude is no longer justified; even the public begins to appreciate that many people recover from consumption and enjoy good health thereafter.

While this is the case, the profession, on the other hand, knows that such results can be expected only under the most painstaking care and efforts, to which the patient and his friends must contribute by strict compliance with advice, requiring an ideal conduct in the patient's life and often social and financial sacrifices, to which the average person is unwilling to submit, unless made to appreciate their imperative necessity.

To tell such a patient that there is a weak spot in the lung, that there is a bronchial trouble, that the lungs are weak, or that there is a slight throat trouble, as is so often the case in instances where the physician knows that the nature of the disease is tubercular, will rarely cause the patient to act as promptly as he should in his efforts for recovery, or to follow our advice in all minute details to a degree necessary to success in our therapeutic efforts.

Having only a "weak spot" in his lung, or a "bronchial affection," he expects that such a condition will yield to ordinary medication, and although we may suggest that these might lead to more serious disease, he does not expect that such will come true in his own case; and not until more advanced symptoms make their appearance are such patients likely to do all we desired them to do in the first place. In the meanwhile, the most favorable period for recovery has passed, and the patient, realizing his condition himself, rewards our generosity with charges of incompetency or neglect.

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(1) Klemperer. Klinisch. Diagnostik. VIII. Aufl. p. 243.

While members of such a patient's family may have been early advised, they, themselves, are reluctant and often entirely unwilling to have him know his true condition, and thus both the physician and the patient's relatives, through mistaken sympathy or through fear of depressing effects, contribute to the eventual loss of a valuable life.

Excepting in the cases of young children and others who are not responsible for their personal conduct, the patient himself should be made acquainted with the nature of his illness.

Not only should we give our true opinion in regard to the nature of the disease, but we should point out that only in such earlier stages, is there any real prospect for a cure, that no time should be lost in undertaking its accomplishment, and that the very best and ideal course must be followed at such a time.

Such an opinion gives the patient the only real chance for his life, to which he is entitled, and our prognosis being as favorable as it is in the early stages, we can easily dispel the temporary depression and disappointment which the patient experiences when he is told an unpleasant truth.

In cases that are still further advanced, and are yet ignorant of the nature of their disease, our true opinion is not to be withheld, nor need our prognosis be depressing, for such a patient is entitled to the best that can be given, even if it is based upon exceptions rather than the rule. In all cases, the patient needs to know the truth for his own, as well as for the welfare of those with whom he lives and comes in intimate contact.

Tuberculosis really being present, and our means for accurate diagnosis being, as a rule, ample and sufficient, few cases that consult us should remain ignorant of the nature of the diseases for any considerable length of time, and with an early diagnosis and a candidly, but hopefully, expressed opinion and prognosis, and the therefrom resulting co-operation between physician and patient, the time is not distant when the disease will be largely robbed of its horror, and when its frequency will be diminished by the preventive efforts, which accompany those for a cure, or for amelioration and prolongation of life.

THE JOURNAL OF TUBERCULOSIS.

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KARL VON RUCK, B. S., M. D., EDITOR.

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ORIGINAL CONTRIBUTIONS.

ARTHRITISM AND TUBERCULOSIS.

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Tuberculosis and the Uratic Diathesis (Arthritism) are rarely found in the same subject; some clinicians go so far as to claim that sufferers from gout possess a peculiar immunity against phthisis. In my own experience I have found in 100 consecutive cases of arthritism, i. e., functional manifestations of the uratic diathesis, typic and atypic gout, only one case of tubercular infection; on the other hand, of 200 selected cases of advanced pulmonary tuberculosis only 3 cases showed coincident arthritic manifestations.

In order to understand the causes of this apparent immunity the author instituted a series of investigations into the pathogenesis of arthritism. In two monographs entitled respectively, "Uric Acid Theories, a Critical Review and Some Original Investigations," (Journ. A. M. A., July, 1899) and "An Investigation Into the Causes of So-Called Uric Acid Lesions, with a Rational Therapeusis of the Uratic Diathesis," (N. Y. Med. Journ., 1900) the following facts in regard to the etiology of arthritism were elicited:

Uric acid is essentially a non-toxic substance and incapable of producing the vast array of symptoms commonly attributed to its presence in the blood of so-called uric acid cases; it acts pathologically chiefly from its tendency to form concretions, and its formation, far from constituting an auto-infection, in reality is a conservative and protective process of dis-intoxication. The true MATERIES MORBI in arthritic cases are the alloxuric bases, a group of leucomaines readily soluble in the tissue-juices and possessing highly toxic properties. As demonstrated by my researches and by the laboratory findings of a number of investigators, they can produce both the large variety of functional disorders grouped clinically under the names of "masked" uric acid lesions, functional arthritism, lithemia, etc., and definite anatomical changes in the kidney parenchyma identical with those seen as precursors of gout and the more severe forms of arthritism.

The alloxuric bases are chemically closely related to uric acid; both are derivatives of nuclein;—heat in the presence of oxygen causes the formation of uric acid from nuclein; if oxygen is withheld the alloxuric bases are formed in its stead—molecule for molecule.

The nuclei of the white blood corpuscles furnish the bulk of the nuclein; where disintegration of leucocytes is great, so that nuclein-katabolism is excessive, we have an increase in the formation both of uric acid and of alloxuric bases; it will depend upon the activity of the oxydation processes of the organism which of the two end-products will be generated; with sufficient oxygenation innocuous uric acid will be formed, if oxygenation is deficient the poisonous alloxuric bases are generated; clinically we observe that whatever agencies produce a leucocytosis also produce an increased excretion of uric acid and of alloxuric bases.

THE NATURE OF THE ARTHRITIC TAINT, according to our researches, CONSISTS IN A TENDENCY ON THE PART OF THE ORGANISM TO DISINTEGRATE A QUANTITY OF NUCLEIN IN EXCESS OF THE NORMAL and the pathogenesis of so-called uric acid lesions presents itself in outline as follows:

At first the normal oxydation processes are capable of converting almost all the nuclein into uric acid, which is duly excreted by the kidneys; at the same time small quantities of the alloxuric bases are formed; these enter the circulation and pass through the kidneys, exercising all the while the toxic influence they are capable of exerting, i. e., they produce a variety of functional disorders and probably lay the foundation to anatomic changes in the kidney parenchyma. As the intoxication progresses in severity, vital processes fall below par and therewith oxygenation is reduced; this adds a second factor to the primary cause of the trouble, because, with deficient oxygenation, even less of the nuclein that is being disintegrated in excessive quantity can be converted into uric acid, and more of the toxic alloxuric bases are necessarily formed. In the natural course of the affliction or aided by indiscretions in diet, mode of life, alcoholic excesses, etc., the perversion progresses in severity, and inflammatory and necrotic processes are set up in the kidneys, joints, etc., that prepare a suitable nidus for the deposit of urate concretions. Virchow (1), in a lecture on nephritis uratica, demonstrates that the urate deposits found in the kidneys of gouty subjects are secondary deposits; the characteristic kidney changes originate in the cortex, the urate deposits are found principally in the parenchyma. Similar conditions are found in the joints; the inflammatory processes and the urate deposits are found in different places; the former are observed in the synovial membranes, the latter in the cartilages. Virchow, finally, calls attention to the fact that the deposits of urates in gouty kidneys are identical as to location and distribution with the calcareous deposits observed in a variety of inflammatory diseases of these organs; he concludes, therefore, that the deposits of urates and of calcareous material have a similar significance; before concretions of either can occur, a suitable nidus must be prepared for their deposit. Ebstein (2) finds that urates are deposited only where the tissues have become necrotic. WE HAVE LEARNED TO RECOGNIZE IN THE ALLOXURIC BASES CIRCULATING IN THE BLOOD OF ARTHRITIC SUBJECTS THE POISONS WHICH, BY CAUSING INFLAMMATORY PROCESSES IN THE JOINTS, KIDNEYS AND ELSEWHERE, PREPARE A SUITABLE NIDUS FOR THE DEPOSIT OF THE MINERAL CONSTITUENTS (CHIEFLY URIC ACID) CIRCULATING IN THE BLOOD AND TISSUE-JUICES.

Three points in this pathogenesis (3) have an important bearing on the subject under discussion in this paper, viz.:

FIRST, the activity of the leucocytes is excessive, as manifested by the increased katabolism of their nuclein.

SECOND, the alloxuric bases, by producing inflammation and necrosis, directly favor the deposit of fibrous and mineral material in certain tissues.

THIRD, uric acid, which has a special tendency to form concretions, is poured into the blood in excessive quantities.

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(1) Virchow:—Berliner klin. Wochenschrift, 1884, Nr. 1.

(2) Ebstein.—Natur und Behandlung der Gicht.

(3) For the details of clinical and laboratory findings, the many animal experiments and analyses of blood and urine made in support of these deductions we must refer to the two monographs quoted above.

When we study the means of defense that the human organism brings to bear against tubercular infection, we find that three agencies principally are concerned in preventing invasion by the tubercle bacillus:

First, the poly-nuclear leucocytes. Throughout the blood-current, and locally, they attack the bacilli. To leucocyte-action is due the formation of epithelioid- and giant-cells, of coagulation-necrosis, of tubercle; it is they who surround the invading host and, in favorable cases, incapsulate the infected area.

Second, the fibrinous and mineral constituents of the blood. They are deposited in the infected area of devitalized tissue and aid in cutting it off from the rest of the body; in this way insufficient pabulum is offered the imprisoned bacilli, their vitality becomes impaired, they form spores and are ultimately annihilated; the necrotic tissues are absorbed and of the whole process nothing may remain but a fibrous cicatrix or a chalky nodule.

Third, the nuclein of the leucocytes. According to Klemperer, Kossel, Lilienfeld, Goldscheider (1), Hoffman (2) and others, nuclein possesses distinctly anti-bacterial, according to Vaughn (3) almost specifically anti-tubercular properties. In an exhaustive monograph on the subject the latter author emphasizes the following points: a. The poly-nuclear leucocytes destroy the germ by virtue of the chemical action of some constituent or secretion; b. As demonstratd by Fodor, Nutall, Buchner and others, the germicidal properties of blood-serum are due to substances that originate in the poly-nuclear leucocytes; c. The natural resistance of the body to bacterial disease will be strengthened by a physiological increase in the production of poly-nuclear leucocytes; d. This increase in the poly-nuclear leucocytes may be induced by introducing into the animal the most distinctive constituent of these cells, which is nuclein. In the summary of 76 cases treated with nuclein (nucleinic acid), Vaughn says that "in initial cases, when the area of infection is limited, the treatment may and often does not only arrest the progress of the disease, but it acts as a curative agent."

We may say axiomatically that when these three factors, leucocytic activity, a tendency to form concretions and nuclein-katabolism, are at a maximum the probability of invasion by the tubercle bacillus will be reduced to a minimum. In an arthritic subject such conditions exist, and we can understand why arthritism, from the very nature of the taint, affords a considerable immunity against tuberculosis.

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(1) Goldscheider und Jakob:—Zeitschrift fuer Hygiene, XXII, S. 2.

(2) Hoffman:—Heilung der Tuberculose durch Glandulen, Hamburg, 1897.

(3) Croftan:—Simplified Methods of Blood-examination; their practical applicability to general diagnosis.—(Jour. A. M. A., Feb., 1899.)

From these theoretic deductions, certain practical information can be gained that is of value in the prognosis and early diagnosis of tuberculosis.

PROGNOSTICALLY, we are justified in making favorable predictions in a case of early tubercular infection in which the presence of arthritism can be demonstrated.

DIAGNOSTICALLY, the presence of arthritic findings is an argument against the probability of tubercular infection.

The diagnosis of arthritism is frequently difficult; the functional disorders include such indefinite symptoms as headache, eczematous rashes, urticaria, asthmatic seizures, dyspeptic disturbances, etc., and are of so vague a character that the clinical diagnosis in the earlier stages remains, as a rule, uncertain. We have, however, two valuable laboratory aids to diagnosis in the analyses of the blood and urine which yield sufficiently positive findings to enable us to frequently diagnose arthritism, even long before the clinical symptoms permit us to more than suspect the presence of the diathesis.

The excretory abnormalities observed in so-called uric acid lesions are typic and uniform in character, if we agree to discard the old theories in regard to the primary role of uric acid and place excessive nuclein-katabolism with deficient oxygenation in their place. Until recently, and by the great majority of practitioners to-day, utterly fruitless determinations of uric acid and urates are made in the hope of finding some inter-relationship between the increased or decreased excretion of uric acid and the progress or regress of the disease. Aside from the fact that the methods popularly in vogue are inaccurate and do not indicate an incalculably large part of the uric acid, and sometimes none of it at all, the plus or minus of excretion of this substance, in the light of our theoretic beliefs, is of subordinate importance. As the alloxuric bases and not uric acid are responsible for the intoxication, a study of their excretory abnormalities should give us positive information, and as the nature of the taint lies in excessive nuclein-katabolism, we should expect to find in a true uratic case an increase in the excretion of the katabolic products of nuclein. If we determine the SUM of the uric acid and of the alloxuric bases excreted, we will always find that this sum is indeed very much larger in an arthritic case than in a case in which the uratic diathesis does not exist. The excretion of uric acid yields little of value and fluctuates within wide boundaries; the values found in uratic cases for uric acid do not differ materially from those found in healthy subjects and in a variety of non-gouty diseases. The values for the alloxuric bases, on the other hand, are always much higher than normal. WHENEVER, THEREFORE, WE FIND AN INCREASE IN THE EXCRETION OF THE SUM OF THE ALLOXURIC BASES AND OF URIC ACID IN A CASE THAT IS CLINICALLY AT ALL SUSPICIOUS, WE MAY ADDUCE SUCH FINDING AS CORROBORATIVE EVIDENCE TOWARD THE DIAGNOSIS OF ARTHRITISM.

The examination of the blood in these cases furnishes another valuable diagnostic adjuvant. Neusser, of Vienna, first described what he calls "Perinucleare Basophilie," i. e., a garland of bluish-black granules clustered around the nuclei of the leucocytes; if the blood is stained by any of the mehtods in vogue these granules can easily be made visible; Ehrlich's stain and a 1-12 oil immersion bring them out very clearly (5). Just what the chemical nature of these granules is it is difficult to determine; from their location and their staining properties there can be no doubt that they are products of nuclein-katabolism and either alloxuric bases, uric acid, or some substance chemically closely related to both. IN URATIC CASES THESE GRANULES ARE FOUND IN GREAT QUANTITIES and while, it is true, they are also seen in a variety of other diseases and, as some authors claim, in normal (?) subjects, still their presence always denotes excessive nuclein-katabolism and is in that sense a valuable diagnostic finding in arthritic cases.

The PRESENCE of such characteristic blood and urine findings, inasmuch as they denote arthritism, is, as we have seen, valuable in the diagnosis and prognosis of tuberculosis.

Inversely, the diagnosis tuberculosis is made more probable and the prognosis in an incipient case more grave if arthritic blood- and urine-findings are completely ABSENT.

We have made quantative determinations of the sum of uric acid and of alloxuric bases in 200 cases of pulmonary tuberculosis and in every instance but three could demonstrate that the figures obtained were near to the normal minimum or below it.

The following table calculated respectively for 50 normal, 50 uratic and 50 phthisic cases demonstrates this relationship quite clearly:

Cases.	Total Quantity of Urine in 24 hours.	Sum of Uric Acid and Alloxuric Bases. (Total Alloxuric Nitrogen.)	Uric Acid Nitrogen.	Alloxuric Bases Nitrogen.
I. Average of 50 Normal cases.	1560 cc.	0.241	0.202	0.039
II. Average of 50 Cases of Arthritism.	1600 cc.	0.404	0.287	0.117
III. Average of 50 Cases of Early Pulmonary Tuberculosis.	1580 cc.	0.201	0.175	0.026

The blood has yielded equally positive findings; in 75 out of 82 cases of early tuberculosis in which we have made blood-analyses, the characteristic granules were absent.

WE CONSIDER, THEREFORE, A LOW FIGURE FOR THE SUM OF URIC ACID AND ALLOXURIC BASES (TOTAL ALLOXURIC NITROGEN) IN THE URINE, IN CONJUNCTION WITH THE ABSENCE OF PERINUCLEAR BASOPHILE GRANULATIONS FROM THE BLOOD, AS CORROBORATIVE EVIDENCE IN THE EARLY DIAGNOSIS OF TUBERCULOSIS.

These signs rank in value, in our experience at least, with such symptoms as the presence of erythism partiel, the initial psychosis, the lisere gingivale, the pseudo-anaemia of the face, the sphygomo-manometric findings and the vague symptom-complexes of dyspeptic, neurasthenic and catarrhal symptoms that are adduced in support of the diagnosis of "pre-bacillary" stages of phthisis. These laboratory aids have the advantage of being positive, and quite independent of more or less educated clinical senses; whether the interpretation we are inclined to give them will bear the crucial test of large clinical experience the future alone can tell.

THERAPEUTICALLY, the understanding of the inter-relationship of arthritism and tuberculosis, and the recognition that one affection confers immunity against the other, affords no suggestions of value; the creation of artificial arthritism in a short time must be considered an impossibility; the disease is essentially a perverted tissue habit, a taint that is in all probability transmitted by heredity, and the foundation of which was laid in our ancestors; without the hereditary taint, the uratic diathesis, in our belief, cannot be made manifest in one generation. The only practical suggestion for a rational phthiseo-therapy that our considerations might have given us, viz., the administration of nuclein, had already been made through a different channel and successfully employed.

THE GROWING NECESSITY FOR SANITARIA FOR THE TUBERCULOUS.

THE INCREASING DISTRUST IN CLIMATE ALONE—INFECTION OF HEALTH RESORTS—THE TUBERCULAR PATIENT A MENACE TO THE PUBLIC—ADVANTAGES OF SANITARIA—COMPARATIVE RESULTS.

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(Read before Mississippi Valley Medical Association, Asheville, N. C., Oct 11, 1900.)

In pursuing for a little the first thought of my subject, I do not wish to deny the potency of climate as a factor in the successful treatment of tuberculosis. From time immemorial it has been the desideratum of the sick, the Mecca to which the baffled physician directs the great caravan of the doomed. While some good may have been done by the indiscriminate recommendation of "change of climate" in tubercular cases, I also believe that the amount of unnecessary suffering and actual harm so wrought has been beyond estimate.

First of all, "climate" is a most indefinite term as we use it in the list of our remedial agents. Flint used to send his patients to Illinois and reported cures, but the victims of tuberculosis acquire the plague in the prairie states, and they, in their turn, are sent to the mountains of Colorado or the foothills of Oregon. The great tide of misdirected woe, reaching the California coast, now returns by way of Arizona and Texas to the shores of the Atlantic, while the search for an Eldorado goes on in vain.

In all of these regions there are climatic advantages that are valuable and well suited to individual cases, but the disappointment has been because patients have gone, without advice, in quest of something they knew not what, to places they knew nothing of, and the result has been too often a bitter failure. I believe that every physician, before sending a patient from home and home comforts, should thoroughly study, not only the climatic conditions of the location selected, but the needs of the individual case. If unable to come to some definite conclusion as to the fitness of the special location, the patient had better not go.

One great wrong against which the intelligent physicians at our best health resorts are protesting vigourously, is that so many patients are sent to them too far advanced to be in any way benefited. It is cruelty, scarcely refined, to send a poor, infected, hopeless case of tuberculosis to some far and possibly out-of-the-way place, where food and comforts and surroundings and sympathy of home are lacking, to inspire hope that any privation or pilgrimage is helpful, to have him endure the heartaches of nostalgia and to die among strangers. No exact rule may be given for our guidance in such cases, but it is always safe to let the patient have the benefit of the doubt, when doubt there is, and keep him at home.

It must not be forgotten that many of our best and most famous resorts are already more or less infected. Why should this be? A village or nook in the mountains becomes famous through the report from some specially adapted case. The rush begins and the VIS A TERGO creates a stampede. It is said that one consumptive may expectorate billions of bacilli daily. What, then, must be the sanitary condition of a place where these poor unfortunates are huddled together in small rooms, fed at poor tables, mentally comparing notes as to their condition of wretchedness, heartsick for home and friends, and expectorating everywhere? It is worse than the unclean islands of the lepers.

I do not hesitate to say that the first thought of the physician when he finds a victim of tuberculosis, should be NOT to suggest a change of climate. First, let him familiarize himself with the conditions of the home climate and those bearing upon the death rate. Then, if confirmed in the idea of the necessity for a change, let him carefully select such a place as will best meet the needs of the case. It may be that this study will surprise him. For instance, it will be found that in our own State of Missouri, where the climate is blamed for many things, that the death rate from consumption per 1000 of population is 1.32, which is a little less than the average death rate of all the States and Territories—and in some of these the total number of deaths was very small.

The fact will also be shown that the average death rate in Colorado, California, Texas and North Carolina is greater than that of Missouri, or 1.46. It will be answered that the increased death rate of these localities is due to the number of victims who go there from other places. I grant you this and that 85 per cent. is a correct estimate of such cases, yet the conclusion is that enough of such transplanted cases die away from home to make the death rate in these resorts greater than it is at home. In other words, the exodus fails to accomplish its purpose.

I grant that for many years nothing better offered the consumptive, and even now incipient cases, well advised, have to thank the change of climate and the surroundings of the new life for restoration. Would that all patients could have, at the earliest stage of their disease, the additional aid that suitable climate might bring to what we are now learning the value of, viz., hygiene, proper food, exercise, specific medicine and the comforts and safety of home. It is this that the sanitarium endeavors to furnish, and these helps that be found in almost every home, if the pyhsician in charge will so direct.

THE VICTIM OF TUBERCULOSIS IS A MENACE TO THE PUBLIC. There is need for ever increasing light upon this subject. The rich harvests of death reaped throughout the centuries has been largely due to ignorance. Results that have been accredited to inheritance are now known to be due to infection. Since the specific cause and nature of this cause have been better understood, there is more hope for eventual control. It is not a Utopian dream that tuberculosis may be relegated some day to the same list as smallpox, yellow fever and the plague. There may be outbreaks, but the restraining barriers will ever grow stronger.

After the much that has been written on this proposition I feel that I need not argue this part of my subject at length. All admit that the great danger of transmission—or portagion—of tuberculosis lies in the sputum. It is true that bacilli are found in the condensed moisture of expiration and in larger numbers in the feces and at times in the urine, but these are not the main sources of the danger; it is in the mucus and necrotic masses teeming with bacilli, which are viable under certain conditions. We look at the countless seeds from a field of weeds, dried in the sun and carried everywhere by the wind, and wonder why all the vegetable kingdom is not given over to weeds.

The myriads of bacilli from one are multiplied by the hundreds as the victims congregate, and day by day and month by month the aggregation goes on. What wonder that there is so much tubercular infection and that in twenty of our principal cities there were 25,000 deaths from this cause in one year? It is not in our own land alone that this march of the conqueror is accomplished. The story is the same in England, France, Germany and wherever records are made. Even in Athens, 33 deaths out of 261 in last December were due to tuberculosis. Is it a startling proposition that at the present rate 10,000,000 of the people living in the United States will die of tuberculosis? Yet such is the estimate.

But we turn to a more hopeful view of this subject. The crusade upon the "great white plague" is scarce begun and sanitation for the limitation of tuberculosis is yet in its infancy, yet already there is a marked decrease in the death rate. Not only does the practitioner yearly record more cases of recovery, but the aggregate, as shown by the health reports, is convincing. The death rate per 10,000 of population in twenty cities in 1888 was 33.03; in 1897 it was 20.21; decrease in death rate 38.8 per cent.; actual decrease in number of deaths 4547.

This certainly means that something is being done to educate and guard the public, but we are only at the beginning. I am not in favor of classing tuberculosis among the actively contagious diseases, nor in reporting each and every case to the authorities. It would be all sufficient, probably, if each case were instructed in the proper care of himself and the danger to others attendant upon his condition. Laws to enforce such instruction should be made and applied.

THE ADVANTAGES OF THE SANITARIUM. It is a matter for congratulation that during the past few years a new and well founded hope has been given in the advance made in the treatment of consumptives at home and in sanitaria. I believe that the education and the attention given to special cases, that must necessarily be a great part of hospital work, will do more to guard the public against the danger of infection than all the laws that could be passed.

There are two lines of treatment in tuberculosis. First—always first—the prevention of development of disease in the predisposed. As already hinted, I am not a believer in the inheritance of tuberculosis PER SE, but rather in the tendency to poor assimilation, faulty development and wrong environment. In meeting these evils the physician should be supreme. He should anticipate disease, and not be found sleeping at his post of duty and observation.

Sanitaria as educational institutions, by teaching and illustrating proper exercise, suitable diet, hygiene in its many applications, and by the encouragement given by careful and conscientious reports, are helpful in many ways, and emphatically so in aiding in this development and prophylactic work in the individual. The questions that are suggested by the thought of the prevention of tuberculosis, either in the individual or as regards the public, are many and varied, and the practical solution of many of them is being made. With more definite ideas of etiology and pathology, and by means of methods for earlier diagnosis, there is a decided lessening of the great fear that has so long attached to the term tuberculosis.

Tuberculosis is essentially a curable disease, and we believe that the largest percentage of cures and the best results are generally obtained in well conducted sanitaria. It is not necessary that patients should go to a far country to avail themselves of this aid. All over the country institutions are building for this purpose, some of them encouraged by the State and others under private auspices, but most of them well appointed and fitted for the specific purpose.

The first sanitarium for the treatment of tuberculosis was founded less than fifty years ago by Brehmer of Goerbersdorf. After many trials, it became a succes and now all over Europe and more recently in America we find these institutions that each year are adding to the sum total of lives saved. The whole world is acting on the belief that tuberculosis may be stamped out. Never in the history of medicine has there been such a unanimity of purpose, not only on the part of the profession, but of the laity as well. The pendulum is likely to swing to the other extreme, and wise measures and careful thought are needed to prevent foolish and Quixotic action. A disease which in England alone annually claims 60,000 victims is not to be lightly put down. The best institutions are needed and the most advanced ideas and positive action required.

May I mention, briefly and without attempt at completeness, some of the advantages of the sanitarium?

First, we accomplish much in the removal of a source of danger to others to a place where that danger can be minimized. The value of this can never be expressed in figures. If it were possible that all consumptive patients could be isolated, how soon would the disease be in abeyance! I do not urge isloation, but I do say that where that can be urged with advantage to the individual the public is the gainer.

Second, the mental rest and quiet is a great aid. Contrast the life of an invalid at one of our so-called health resorts where he is left to the tender mercies of "mine host" of the frontier hotel, the skill of the chance physician, the companionship of others as miserable as he, and the heartsickness of nostaligia with the comforts to be enjoyed at a well conditioned "home" or sanitarium, where all sense of responsibility is removed and there is the encouragement of those who know how to give mental as well as physical aid.

Third, there is the problem of diet. Assimilation is the great antagonist of tubercular disease. To increase this function is to limit the advance of the specific invasion. Cod-liver oil and the malts and a hundred other food preparations have done much in a general way, but it is only when we come to study the individual needs that we can get the best results. I believe that proper feeding, as it can be done in the well conditioned home or in the sanitarium, and nowhere else so well, is in the average case the foundation of all treatment.

Proper and well graduated exercise is, in many cases, a great help. This is frequently overdone. Exercise is an aid only so far as it is helpful to the nervous system and so far as it increases metabolism. It should be regulated by the physician and, in patients with a quick pulse and perturbed nervous condition, it should never be interdicted. Rest, food and sunshine first and exercise of body and mind later. In passing, let me say that in cases of faulty development and poor respiratory action, especially at the apex, rightly adapted exercise with a view to increase the functional value of that part of the lung is of the highest importance.

The open-air treatment is now being advocated. Of its value there can be no doubt, but it must be limited in its application to suitable cases. There is no reason why patients in whom it is indicated cannot live almost altogether in the open air in most of our states. At Mount St. Rose it is our intention to have large sheds built, with movable wind screens, and to have them furnished with chairs and plain cots. Selected cases will live there most of the year and, by a very simple method devised by Dr. Ross, the cots can be warmed in severe weather and yet the patients have all the advantages of outdoor life.

In cases where there is poor functional activity, I am an advocate of the shower bath or the spinal douche. There is no tonic more direct than this where there is impaired vaso-motor contractibility and consequent want of tone in all the organs and in the circulation of the extremities. The frequent flushing of the lower bowel, in conjunction with the daily use of the shower bath, will often do more to reduce the afternoon pyrexia and increase the comfort of the patient than anything else that I know of.

It is in the sanitarium that special symptoms can be best cared for. Fever that demands rest and quiet, cool sponging and the least harmful antipyretic; haemorrhage that requires prompt and efficient help; night-sweats that are so depressing, mentally and physically; laryngeal complications that can often be controlled in the early stages and are the bane of the physician's life and the curse of the patient's in the later stages, these and a score of other complications, are all best met in the average case in the well conducted special hospital or sanitarium. It is attention to detail that tells in so many of these cases. In no other disease is it more necessary to individualize and to change the treatment, not only to suit the particular case, but to meet different indications in the same case. It is "eternal vigilance" that is the price of success.

I will not here detain to speak of the advantage of specific medications that have for their purpose the limitation and destruction of the bacilli. I believe firmly in these methods and that in the use of creosote and of well proven serum we have an advantage that physicians of former years did not possess. These are not all, but only a part, of the treatment, and call for special care and observation on the part of the physician.

What as to results? Better, I am sure, than we dared to hope for a few years ago. In four of the best known, the Adirondack, the Loomis, the Sharon and the Winyah, all in this country, 67 per cent. have been benefited and about 25 per cent. cured. Not only this, but who can estimate the good resulting from the better knowledge of sanitation and the value of the lives thus prolonged? What stronger argument can be used in appeals made to the State for institutions for the poor than the recital of the history of lives saved by sanitarium work? When a few citizens are in danger from a savage foe in the Orient, armies are sent to the rescue and navies are sent to the antipodes. Newspapers record the progress and the whole nation stands waiting. Is it too much to ask that the same government should show the same anxiety to release its citizens from a foe that destroys more than ever were slain in battle and to protect against a more insidious invasion than ever came in the guise of war? We need sanitaria not only for the rich, but for the poor; for tuberculosis cannot be limited to any great extent till the poor are cared for. I believe that the day is coming when the tubercular patient will be cared for as efficiently as the patient with smallpox or yellow fever, and that day cannot come too soon.

IMPORTANCE OF EARLY DIAGNOSIS AND PREVENTION OF TUBERCULOSIS.

BY J. L. CAMPBELL, M. D.

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In regard to tuberculosis the most important two questions before the profession today are how to prevent its spread, and how to diagnose the disease and treat it at as early a stage as possible. If anything is to be done for tuberculosis, it must be done in its incipiency. Since the discovery by Villemin that tubercular matter is infectious, and, later, the discovery of the bacillus by Koch, there has been no doubt in the minds of intelligent men as to its etiology.

First and most important is, how to prevent the spread of the disease? It is appalling to think of the number of bacilli expectorated by one consumptive in a day, and when we know that they are disseminated in the dust of our churches, theatres, halls, cars and other public buildings and vehicles it is a wonder that we are not all infected.

Dr. Wm. Osler recognizes four modes of infection. First, hereditary transmission. In a clinical lecture some years ago, I heard Mr. Jonathan Hutchinson say that he believed the bacillus was transmitted directly from the parent to the child, and remained latent in its tissues until some time when circumstances were favorable for its development. This theory is held by Baumgarten et al., and may be true. It looks as if it really were true in children affected with bone and glandular tuberculosis. If this be the state of affairs, nothing short of a regulation of marriage by law will regulate the spread of the disease, and many years will pass e'er the people will consent to anything of that kind. Happily, we do not believe this is the only or most frequent mode of infection, although we do believe children of tubercular parents inherit tissues that are peculiarly susceptible to the disease, and they should be so taught that they may be able to guard against any possibility of infection.

Second, inoculation. There is an abundance of experimental and clinical evidence that tubercular matter is infectious. This was first pointed out by Villemin in 1865. But local inoculation, as from a scratch or wound, rarely becomes constitutional, although the lymphatic glands may become involved.

Third, and to my mind the most frequent, mode of infection is by inspiration. Children of tubercular parents should be taught to avoid public houses, especially when they are being dusted and swept, and to avoid working in offices where persons suffering from this disease are employed. I know of a few cases I can trace to the latter source, and a number, principally among janitors and housemaids, traceable to the former. There is little danger in the dust and on the streets, as the direct rays of the sun destroy the bacilli in a short time. Then, again, there should be a law against expectorating in public buildings, cars, etc., and all tubercular persons should be taught by the profession that they are likely to infect others. There are few persons who would not be careful, if they only knew the dangers they entail on others. It is not, however, in the scope of this article to prove that tubercle bacilli are present in the dust of public halls and conveyances, for enough has already been written on that subject.

Fourth, and probably the next most frequent, means of infection is through the food. Persons, and especially children, drink the milk of tubercular cows and eat tubercular meats. In this way the bacilli are deposited along the alimentary canal, causing intestinal tuberculosis, or they are taken up by the lymphatics and distributed throughout the body. This is probably the easiest source to control, for the dairy herds and beef cattle of the large cities, and even towns, can be inspected by competent men appointed by the State or United States.

There is no race or climate in which the disease does not exist and very few animals seem to be immune. There are isolated cases of persons that seem to enjoy immunity even when having constantly nursed the disease without precaution. The negro race of the South, and especially mulattoes, seem especially susceptible.

I cannot say from my experience that one form, unless it be a general miliary peritonitis, is more general than another in the colored race. I have seen, in the last seven years, a great many cases in the subjects used by us at the Atlanta College of Physicians and Surgeons. Probably 10 or 15 per cent. of these had died with the above mentioned form of the disease—all negroes. Negroes seem to be very free from haemorrhages. We have made autopsies on cases where there would be several cavities in one lung without any history of haemorrhage. As the negroes are so especially susceptible—their habits and places of living tending to increase the spread of this as well as other infectious diseases—there should be thoroughly reliable men appointed to inspect their quarters, report each case and teach them how to care for it. In order to do this more thoroughly for the rising generation, the leading negro schools and colleges should take especial care to somehow incorporate this in one of their branches.

To the people, white and black, should be taught how to use chemical disinfectants. A saucer half filled with Darby's fluid and set under the bed or on the window sill has no more influence than if left in the bottle. They should be taught what disinfectants and what strengths to use and that they must be put in direct contact with the substance to be disinfected and allowed to remain for some time, in order that any good may be accomplished. All this and much more can and will, I hope, in the near future be taught in the public schools.

Next in importance is for the physician to make an early diagnosis and know how to treat his patient when the diagnosis has been made.

The best means of making an early and sure diagnosis is the "tuberculin test." This should be resorted to in the early stages in every case where there is doubt, when the physical signs are not sufficient and the sputum does not contain the bacilli. As a rule, the physical signs will be sufficiently prominent, for a decision to be made long before the sputum will contain a sufficient number of bacilli for them to be detected by an ordinary examination. If the physician is skilled in the use of the stethoscope he will be able to detect a prolonged and roughened expiration, with, or probably without, a few moist rales. If in one lung, and especially in the apex, such a state of affairs should lead to the use of the "tuberculin test." If more positive signs are waited for, much valuable time is lost—time that means life or death to the patient. Some cases apparently recover after breaking down has occurred, but they are rare.

Now, as to the mode of treatment to use. There are many so-called consumptive cures before the profession. I refer now only to those that lay claim to the attention of the legitimate members of the profession. There is as yet no positive specific, and probably will not be for many years; but certain members of our profession are working on the right road, we believe, and while they may not themselves reach the goal, their successors will.

The inhalation treatment seems to appeal to the popular mind, but a moment's thought proves conclusively that no vapor can reach the bacilli, as they are walled off, even in the beginning of the disease. And even if we could get it to them it could not be kept there long enough to do any good. We cannot saturate the blood and fluids with an antiseptic of sufficient strength to be of any benefit, as the patient would succumb long before the bacilli, even could these fluids be brought in contact with them.

Hence the only thing left to do is to build up the patient, try to increase the phagocytic power of the leucocytes and enable the antitoxin to be produced in the blood plasma, thus limiting and encasing the deposits already present and preventing the formation of others. How to do this is a great question. I believe, with the best light we now have on the subject, that tuberculin is the best thing to use, coupled with reconstituent tonics, digestive stimulants and tonics, good food and plenty of sunlight and fresh air. If a climate can be found where sunlight and pure air are plentiful all the year round the patient should be sent there and treated with some of the tuberculins.

Here in Atlanta we have had some success with Koch's old tuberculin given in 1-10 mgm. doses and long continued. This has been most successful in laryngeal cases. I have been very much gratified with its results in a few cases, but haven't the data at hand to give positive results. I have tried tuberculin-R. (Fisch) given in increasing doses and administered in a 1-10,000 solution of formalin, but cannot say how it will result, as my experience is limited. Antiphthisis serum T. R. (Fisch) is having quite a sale here now and I learn that it is being used with good results.

Work is certainly being done along the right line, and before many years an antitoxin will probably be found that will as surely stop the advance of consumption, if taken in time, as diphtheria antitoxin relieves and stops the progress of that disease.

SOME PERSONAL OBSERVATIONS ON THE MANAGEMENT AND TREATMENT OF PULMONARY TUBERCULOSIS.

BY BOYD CORNICK, M. D., KNICKERBOCKER, TEXAS.

The most important single condition precedent to the successful treatment of pulmonary tuberculosis is an early diagnosis. No fact in medicine is better established than that a permanent arrest of the progress of the disease occurs every year in thousands of cases of limited tuberculous infection. Even under unfavorable conditions the restorative powers of nature often effect a cure. Though climatic influences be unsatisfactory and hygienic surroundings far short of ideal; though diet be limited in quality and variety, yet the VIS MEDICATRIX NATURAE not seldom brings the further progress of the disease to a permanent standstill.

True, a lamentably large number of cases, by reason of bad surroundings and individually defective powers of resistance, go from bad to worse, until a stage is reached where palliation and not cure is all that may be hoped for. Admitting the frightful mortality from tuberculosis—so great that it may be confidently predicted that more than ten millions of people now living in the United States will die from this one cause alone—and admitting the gravity of the prognosis in cases of extensive involvement and advanced stages, yet I am convinced that the laity in general, and a very large proportion of the medical profession likewise, are disposed to take a too hopeless view of early-stage cases, after the diagnosis is once established. They appear to consider that the definite determination of the presence of pulmonary tuberculosis is equivalent to a pronouncement of the death sentence.

The wide prevalence of this gloomy view is due, I think, to two principal causes:

FIRST, the usually tardy recognition of the disease, too often only after extensive involvement and destruction of tissues make the prognosis at best a doubtful one; and,

SECOND, too great reliance on treatment by medicaments, to the practical exclusion or disregard of diet, hygiene and climate.

It is a cause for general congratulation that the early recognition of tuberculosis is of late receiving that consideration and discussion by the profession which its great importance demands. Recent advances in diagnosis by means of bacillary derivatives, render it possible for every physician, with no more expensive or complicated apparatus than a hypodermic syringe, to determine safely and with practical certainty the existence of a tuberculous deposit, at a period when the symptoms have perhaps but aroused a suspicion of its presence, and the physical signs are at best merely suggestive, and the testimony of the microscope is as yet wholly negative. This is the time when judicious measures may most reasonably be expected to effect a cure, and when neglect, whether due to indifference, to lack of means or lack of knowledge, is so apt to be followed by a fatal train of consequences.

Before detailing briefly those therapeutic measures which under my own observation have appeared most helpful, since having been compelled to resort to change of climate ten years ago on account of my own infection with rapidly progressing tuberculosis, I should say that dietetic means had already in my earlier practice been impressed on my judgment as outweighing all other helpful agents of which I had personal knowledge. Time and time again had I witnessed the complete subsidence of all symptoms following improved nutrition; and in several instances the arrested tuberculous processes of fifteen years ago have remained, even in Illinois, quiescent to this day.

It is a rule, to which the exceptions are not numerous, that tuberculous individuals have been habitually indifferent eaters. They are usually not fond of meats, and possess very generally a repugnance to fats. In consequence nutrition falls below par, resistance to infection is greatly diminished and recuperative capacity is at a low ebb. Living on a diet containing insufficient proteids and too large a proportion relatively of starches and sugars, a marked fermentative dyspepsia very commonly supervenes, resulting in malnutrition and defective resisting power. Then infection occurs, or spreads perhaps after long quiescence, and wasting begins. It is of fundamental importance in a wasting disease, whose very name, consumption, emphasizes this characteristic, that all our efforts should be directed toward promoting nutrition. In a starved body the VIS MEDICATRIX can accomplish nothing.

It is in such cases, before destructive processes have advanced too far and hectic fever has fatally impaired the nutritive processes, that a diet rich in proteids, "balanced" with as much of fats and oils as may be easily assimilated and (for a time at least) containing no starches, has under my observation often visibly built up the diminished bodily weight, while at the same time correcting the malnutrition due to fermentative indigestion, by withholding the starchy and saccharine foods upon which it flourishes. A half pint of hot (not warm) water, sipped twenty minutes before each meal, assists greatly in combating this form of indigestion and thereby promoting nutrition. This is chiefly, but by no means exclusively due, I think, to the mechanical effect of the hot water in washing out the stomach before ingestion of food. It is gastric lavage without apparatus.

For those patients, then, with fickle or perverted appetite, suffering often more or less from sour eructations after meals, a dietary similar to the following may be prescribed with marked advantage for a period of from one to four weeks at a time: A half pint of HOT water twenty minutes before each meal. Breakfast, dinner and supper to include ground beef (preferably from the round) simmered in a covered stewpan, with just sufficient water to prevent sticking to the pan, seasoned to the taste, not too well done; milk, preferably, or cocoa; fruits in season, raw or cooked, not sweetened. No bread; no potatoes; no sweets.

The meal should be eaten slowly. To prevent monotony the ground-beef diet may occasionally be varied by broiled tenderloin, mutton chop or chicken, and be supplemented at breakfast by two soft-boiled eggs. The quantity eaten is quite as important as the quality, and after a few days the patient, if duly impressed with the importance of this matter, can often partake of considerably more than a pound of beef at each meal. Under this dietary (not unlike the Salisbury diet) I have frequently seen a gain in weight of a half pound a day for a week or two at a time. One patient, now under observation, has in the last fifteen (15) days gained eleven (11) pounds while adhering to this diet.

After a while, when digestion and assimilation are improved, a more varied diet may again be allowed, of which some form of meat should still remain the chief constituent. Should the ingestion of starchy and saccharine foods again be followed by fermentation, the administration of a pure article of creosote—the commercial creosote should NEVER be given—will often arrest the fermentation quite satisfactorily. It is solely as an anti-ferment that I prescribe creosote; and when the desired object is achieved, the remedy is withheld. Taken in sweet milk at the end of each meal, it is tolerated best. I have seen no advantage possessed by the carbonate of creosote, by guaiacol or its derivatives, over creosote pure and simple. Their administration in excessive quantities, with a view to saturating the system and thus combatting the bacilli, is a demonstrated fallacy, and may seriously harm the digestive apparatus besides.

While suitable regulation of the diet is practicable in any climate and in every climate, yet the results of dietetic treatment are often disappointing, unless all climatic conditions are most favorable for leading an outdoor life. One must be much out of doors to secure the oxygen and the sunshine which are so potent restoratives of impaired nutrition. But all over the world, where we find the densest populations and the greatest numbers of pulmonary invalids, we also find much rainfall, cloudiness and atmospheric humidity; and these climatic influences effectively forbid to an enfeebled and sensitive invalid that free open-air life at home which is so essential to the best nutrition.

If, despite the wonderful advancement of modern chemistry, a century's time had to elapse from the discovery of oxygen until the new element, argon, was found, a few years ago, to be also a constituent of the atmosphere, we may hardly hope in the current generation to reach a universally accepted solution of all the mooted questions regarding the influence of climate on pulmonary consumption. While there is no general agreement, for example, among climatologists as to whether the aerial rarefaction of high and sunny mountain climates, where many consumptives get well, is to be regarded as a help or a hindrance to the sunshine and dryness in accomplishing this result, there is one point at least on which there is substantial unanimity, namely, that in the climatic treatment of pulmonary tuberculosis the factors of dryness and temperature are favorable in proportion as they permit an open-air life in winter and in summer, by night and by day.

Wherever, then, by sleeping on a sheltered veranda at night, the health seeker can avail himself of 21 hours of outdoor climate on the average out of every 24-hour period, without being driven indoors by frequent rains, or chilled to the marrow by heavy dews, greater benefits should reasonably be expected, other things being equal, than where "the invalid's day" (i. e., out of doors) is necessarily limited daily, by reason of cold or dampness, to a half, to a third or even a quarter of this period. Judging from my personal observation for the past decade, a dry and sunny climate, characterized in the main by agreeable average temperatures, possesses more value in promoting nutrition and arresting the progress of pulmonary consumption than all the medicaments, new and old, of the official pharmacopoeia, if relied on in a climate where much cloudiness and humidity prevent living out of doors.

But the commendation of life in the open air must not be understood as implying in all cases an advantage from active or prolonged exercise. On the contrary, physical rest, or at any rate careful regulation of physical exercise, is essential in febrile cases, if the patient's temperature ranges frequently above 100° F. But rest in the open air, where climatic conditions permit it, is incomparably better than shut in by the four walls of the best ventilated room.

My use of specific medication in phthisio-therapy has been limited to an anti-tubercle serum, two various modifications of tuberculin and the watery extract of tubercle bacilli. After carefully observing, during a period of three years, the effects of treatment with a widely used anti-tubercle serum, I could not doubt that, in spite of occasional disagreeable symptoms following its administration, it nevertheless gave beneficial results—in some cases most marked. Yet I saw no case which from its use I could regard as definitely cured. Attributing considerable merit to the preparation (probably due in some measure, as Dr. Denison has suggested, to its transmitted tuberculin effect) I would still continue its use in selected cases as a helpful agent, were it not that I regard the direct bacillary derivatives as possessing very much more merit.

My trial of antiphthisin (Klebs) and of purified tuberculin (von Ruck) was favorable, but was too limited, both as regards the number of cases treated and the duration of treatment, to make my conclusions of any special value.

For fifteen months past the sole specific agent employed by me in the treatment of tuberculous cases (I use the word specific in the sense of being designed to combat the cause of the disease) has been the watery extract of tubercle bacilli (von Ruck). Though my cases dismissed as cured, since beginning the use of this preparation, are thus far limited to but two in number (one of whom has, since dismissal, submitted, after the lapse of four months' time, to the diagnostic test without the occurrence of febrile reaction following) yet my careful and repeated observation of the specific action of the remedy, as shown by the disappearance of recent tuberculous deposits, and by the clearing up of recent pulmonary infiltrations, convinces me that we have in this preparation an agent which, in selected cases and with suitable adjuvant management, is capable of removing deposits of tubercle, and of thus curing tuberculosis. I have not felt warranted in selecting only incipient cases for its administration, any more than I should feel warranted in excluding advanced cases from the possible benefits of other helpful measures of recognized merit. In one hopelessly advanced laryngeal case I could recognize no benefit whatever from its use. In other seriously advanced cases, though the lesions were extensive and the infection was intense, yet the clearing up of considerable areas of infiltrated pulmonary tissue could be clearly recognized. This was shown by the complete subsidence over well defined limits of all abnormal physical signs. In every case of recent origin this effect of the treatment was clearly recognizable as beginning in from four to seven weeks; and in all early-stage cases the general symptoms have invariably and correspondingly improved.

It has been contended by some that where marked benefit has followed change of climate and the coincident administration of specific treatment, the whole benefit may be accounted for as due to climatic influences alone, and that the coincident use of a serum, or of a direct bacillary derivative, was of negative influence in bringing about the observed improvement. This purely speculative criticism can be entertained or advanced only by those who have not tested the chemico-pathological affinity for tuberculous deposits possessed by the various tuberculins and by the watery extract. The local reaction, recognizable by auscultation, which invariably follows, at the site of recent deposits at least, on the administration of properly graduated quantities of whichever preparation is used, demonstrates the possession by these agents of a powerful local influence of some kind on tuberculo-pathological tissues. And if experience demonstrates that this influence is not constitutionally detrimental, while it is frequently attended by the gradual clearing up of local infiltrations, it must be admitted, whether this beneficial result be explicable on the ground of the gradual liquefaction and consequent absorption or expulsion of tubercle, or on the ground of the induction of immunity, or in some other way, that we have in this series of remedies a means of accomplishing positive results which was previously unknown.

XIII. INTERNATIONAL CONGRESS.

REVIEWS AND EXTRACTS REPORTED ESPECIALLY FOR THE JOURNAL OF TUBERCULOSIS

BY SILVIO H. VON RUCK, M. D.

GELATINIZED BLOOD AS A CULTURE MEDIUM FOR MICROBES WHICH DO NOT DEVELOP ON THE ORDINARY MEDIA.

(By Dr. Fernand Bezancon and Dr. v. Griffon of Paris.)

"The greater number of pathogenic micro-organisms which do not develop on the ordinary laboratory culture media, on the contrary grow in abandonment if one gives them a medium which approaches in nature that which they find in the living organism. It is with this idea that we have tried to utilize as a culture medium the unmodified blood itself, of man or of laboratory animals. In order that the blood may constitute a solid medium which may be employed for the isolation of germs, it must be furnished with a substratum of gelatine. The latter mixes with the blood while still liquid, in the cooling process imprisons the blood en masse without apparently modifying it.

"On the gelatinized blood of a rabbit with an addition of glycerine, we have been able to obtain directly the first cultures of tubercle bacilli not only from the organs of guinea pigs, but also from human tubercular products, as pus of a cold abscess, pus from a tubercular testicle. We have, in fact, been able to disclose for the first time by this culturing method the presence of tubercle bacilli in sero-fibrinous pleural fluids."

So much of the paper concerns the tubercle bacilli. Other germs discussed are the bacillus of leprosy, gonococcus, bacillus of Pfeiffer, etc.

OF THE ETIOLOGICAL ROLE OF TUBERCULOSIS IN SEVERAL CASES OF ASPHYXIA AND OF SYMMETRICAL GANGRENE OF THE EXTREMITIES—SYNDROME OF RAYNAUD.

(By Dr. Louis Renon of Paris.)

Recent studies on asphyxia and symmetrical gangrene of the extremities tend to dismember the curious affection described by Maurice Raynaud, and to render it more a syndrome than a morbid reality.

The etiology and pathology of this syndrome have profited by the current notions of toxic infections. I wish to insist upon the reports which in undeniable cases seem to me to unite tuberculosis and symmetrical gangrene of the extremities; however, I would except certain tubercular affections, such as vertebral tuberculosis, which can have a nervous influence only too manifest.

The coincidence of the two affections indicated by several authors, notably Urquhart, Marcel See and W. Byers, was particularly interesting in one of my cases. This patient lost, in ten days, almost all of the phalanges of the hand and parts of his ears. Subject of a tuberculous adenitis and of a pulmonary tuberculosis, this man presented at each cardiac·impulse a crisis of cyanosis and of pains in the mutilated stumps of his fingers.

I cannot say how the tuberculosis acted. It is impossible for me to determine whether it acts directly on the vessels or by an impregnation of the nervous system, central or peripheral, as Schmitt met with in "acroparesthesie." I wish merely to put an etiological factor into evidence.

PRE-TUBERCULOSIS AND HEREDITY—THE LAW OF HEREDITARY REACTION.

(By Dr. G. E. Papillon of Paris.)

Heredity determines not alone the general predisposition to tuberculosis. It determines also the type of the pre-tuberculosis, that is to say, the manner in which the first symptoms of the intoxication of the organism will manifest themselves, from the beginning of the pre-tubercular stage.

The author recalls his recent communication to the Congress of Naples, on the reaction of tuberculin, which is for him an ordinary physiological phenomenon, the injection producing a resorption of toxins which proceed from a tubercular centre, sometimes still latent.

Of the three elements of this reaction—phagocytic, thermic and sympathetic—the last manifests itself at its maximum in the organs or mechanisms whose hereditary antecedents have predisposed them to morbid reactions. Thus the debut of a chloranaemic form is observed almost exclusively in the descendants of simple chlorotics, or of anaemics rendered so by profession (for example miners).

The form described by Papillon under the name of "neurasthenic pre-tuberculosis" is almost peculiar to the descendants of neurasthenics. Also the initial dyspeptic syndrome of tuberculosis is the ordinary clinical type of debut of tuberculosis in descendants of dyspeptics.

Furthermore the pseudo-arthritic, cardiac and pseudo-uraemic forms are to be observed in the descendants of arthritics, cardiacs and arteriosclerotics.

The author in concluding emphasizes the importance, for the early diagnosis of tuberculosis, the knowledge of the non-tubercular hereditary antecedents, and he formulated a law of "hereditary reaction" which in recalling antecedent defects possesses a diagnostic value superior to that of the tuberculin test.

TUBERCULOSIS AND SYPHILIS.

(By Dr. Samuel Bernheim of Paris.)

The author has had occasion to verify this association in forty-three cases, and from the clinical reports he concludes as follows:

1st. Since tuberculosis is the most widely spread disease in the world, and since syphilis is second only in frequency, there is nothing surprising in the fact that the two diseases are often associated in the same individual. Close observation has further demonstrated this asssociation.

2d. Syphilis, without being able to cause tuberculosis, nevertheless predisposes to that infection, first because it greatly debilitates the system and second because it creates many points of entrance where the Koch bacillus can introduce itself. An "open" syphilitic should never come in contact with a tubercular patient, of whose infection he can so easily become the victim.

3d. The progress of this morbid association is not always incidental in a consumptive. (Note—He means when a consumptive contracts syphilis as contrasted with the cases in which the syphilitic contracts consumption.) The influence of the secondary infection depends upon the period of its contraction. This influence is almost unnoticeable in the "pre-tubercular" stage and in patients in the first stage of tuberculosis whose general condition is excellent. The effect is, on the contrary, deplorable in tubercular patients weakened by excess or by the ravages of the disease (tuberculosis).

4th. When tuberculosis seizes upon a syphilitic subject the prognosis varies—very grave at the primary and secondary periods of syphilis, in the tertiary period the progress is milder. This mildness is due more to the sclerotic tendency of that period than to the exhaustion of the syphilitic virus.

5th. Specific medication is badly tolerated by the tubercular syphilitic in the first two stages of the disease (syphilis). But it is necessary (since this morbid and grievous association has been modified) to surround the patient with excellent hygienic conditions and to administer to him hypodermically a salt of mercury in small doses, repeated at distant intervals.

TUBERCULOSIS AND PREGNANCY.

(By Dr. Samuel Bernheim of Paris.)

After having reported numerous personal observations, and after having interpreted the facts observed by different authors, Dr. Bernheim draws from his study the following conclusions:

1st. Pregnancy does not provoke tuberculosis fatally in the predisposed. Latent or previous tuberculosis is not invariably awakened by a single and a simple pregnancy. Gestation in those predisposed to tubercular infection is the more likely to cause an awakening of latent trouble, the younger the woman is. Hence the primary reason for forbidding too early marriages of girls whose debility threatens an ulterior bacillary invasion.

Still further, it is necessary to exercise a long surveillance before permitting pregnancy in a tubercular woman, as well as to be certain of her definite cure.

2d. Tuberculosis is, moreover, aggravated by pregnancy in that the lesions become deeper and more extensive. A fatal result is almost certain in advanced cases.

3d. Although single pregnancy may occur without grievous effect, in a patient the subject of latent tuberculosis, such is not the case with multiple pregnancies, which are almost always disastrous, even in women with curable phthisis.

4th. The consequences of child-birth are particularly formidable to the tubercular woman to whom nursing has been forbidden.

5th. In all cases in which tuberculosis is aggravated in the first weeks of gestation, the practitioner is justified in inducing abortion. This is the rule adopted by many German and English physicians.

6th. The influence of paternal tuberculosis on the progress of pregnancy may be considered as practically nothing.

7th. Tuberculosis in the woman is frequently a cause of abortion.

8th. After the confinement the new-born child should be removed immediately from the center of infection. In thus placing it under good hygienic conditions one has a much better chance of raising a robust and healthy subject.

PRIMARY TUBERCULOSIS OF THE FEMALE GENERATIVE ORGANS.

(By Dr. Samuel Bernheim of Paris.)

The author has collected eighty observations of primary tuberculosis of the female generative organs, and from the ensemble of the cases he has drawn the following conclusions:

1st. This bacillary localization is not rare. One can more frequently diagnose it if one makes a systematic examination for the bacillus of Koch in all genital excretions of the woman who suffers from uterine affections.

2d. Primary tuberculosis of the genitals is most frequent in women in full sexual activity, i. e., between eighteen and thirty. It has, however, been found in young children and in old women.

3d. The causes of infection are multiple-sexual relations, previous infections as chancre, syphilitic ulcerations, blennorrhagia, introduction of improper foreign bodies. Certain indvidual conditions favor such infection.

4th. The bacillus has a preference for certain parts of the generative organs. Thus it is that one more frequently finds this primary tuberculosis in the ovaries and tubes, and more rarely in the uterus and vulvo-vaginal canal. (The author gives anatomical and bacteriological reasons for these facts.)

5th. When a uterine affection does not clearly present an inflammatary aspect, it is necessary to think of tuberculosis which one may diagnose by the combination of special symptoms, and in obscure cases by the tuberculin test or by the sero-reaction.

6th. The treatment will be surgical where the tubercle bacillus is associated with other microbes and when suppuration is threatened.

Therapeutic, hygienic and dietetic measures may be employed with success in the greater number of other cases.

A CONTRIBUTION TO THE STUDY OF NASAL TUBERCULOSIS.

(By Drs. Texier of Nantes and Bar of Nice.)

Although numerous works have called attention to nasal tuberculosis, it is a very infrequent affection and still more rare when primary. As a rule, it is secondary to a general or local tuberculosis of the respiratory passages. We submit here three cases of our personal observation. These cases are unpublished, and so will augment the number, still very small (about 70) of published cases. Classifying them as Cartes has done, we may describe a pseudo-polypoid and an ulcerative form; and even, according to Chiare, a granular form.

This affection can by no means be confounded with lupus or tertiary syphilis of the nose.

The prognosis is subordinate to the general condition of the patient and to the form of the local affection.

The most efficacious treatment is curettage with the application of lactic acid (80 per cent.) in addition to general symptomatic treatment.

Case 1. Of pseudo-polypoid form, situated anteriorly, was primary (rare).

Case 2. Also of pseudo-polypoid form, was secondary, pseudo-oedematous and accompanied by miliary granulations of the posterior third of the nasal fossa and of the pharynx.

Case 3. Was of ulcerative form limited to the nasal vestibule. The ulceration was irregular, inflamed and very painful, and surrounded by characteristic yellowish tubercles.

Cases 1 and 3 were cured by curettage and applications of lactic acid.

PRIMARY TUBERCULOSIS OF THE LARYNX.

(By Dr. Samuel Bernheim of Paris.)

The author reports a large number of observations from which he concludes that:

1st. The larynx is very frequently, more frequently than one would think, the seat of a primary tuberculosis. This localization is demonstrated by the twenty-nine personal cases observed and where no other organ but the larynx was primarily attacked. Similar observations have been reported in large numbers by Gouguenheim and Moure, Helary, Dardano, Heinze and others.

2d. Primary tubercular laryngitis is to be recognized by particular characteristics, which nicely distinguish it from laryngitis of any other nature. At the very beginning of the affection small miliary granulations of pathognomonic appearance may be seen in the region of the arytenoids. Later those granulations unite and break down, forming irregular ulcerations, often deep and involving almost the entire organ. The slow process and the phenomena of denutrition (general emaciation, etc.) distinguish this variety of bacillary laryngitis from that which is purely inflammatory.

3d. This variety of initiatory and infiltrated tuberculosis is capable of transformation into different varieties ("sclero-vegetant" or papillomatous, in type pseudo-polypoid).

All these clinical forms may be recognized by bacteriological examination and by animal experimentation. A rapid and inoffensive means of diagnosis is the injection of tuberculin, which produces a local pathognomonic reaction.

4th. Primary lupus of the larynx is a form of laryngeal tuberculosis of slow progress.

5th. It is of the greatest importance to establish the diagnosis early if one would prevent the generalization of the disease.

6th. Laryngeal tuberculosis is susceptible of cure and often heals spontaneously.

Besides a mild local antiseptic, the therapy of choice consists in a hygienic and dietetic treatment.

A CASE OF HYPERTROPHIC TUBERCULOSIS OF THE SMALL INTESTINE.

(By Dr. Declaux of Paris.)

This case is that of a woman 53 years of age, entered at the Hospital of Lariboisiere and operated on by Dr. Tuffier for an intestinal stenosis, the tubercular nature of which had been suspected. (Report of clinical examination, operation and histological examination, published by Dr. Tuffier in "La Presse Medicale," February 21, 1900). Fragment of intestine given to Dr. Delcaux for examination.

On cross section the intestine showed a thickness of from four to five times that of the normal. The hypertrophy was chiefly of the submucosa. The mucosa had almost completely disappeared. Glands of Lieberkuehn were dilated, and their cul de sacs more numerous than in normal state, while the interstitial tissue showed a considerable round cell infiltration. In the muscular layer the bundles were increased in number. The sub-mucosa, which was most involved, was formed of adult fibrous tissue showing oedema (oedema due to operation).

In places it presented, especially in its deeper parts, accumulations of lymphatic cells enclosing numerous giant cells. Here were found a very, very few tubercle bacilli, difficult to stain. The vessels of the sub-mucosa were appreciably thickened and were often surrounded by masses of lymphatic cells.

The muscle strata also showed hypertrophy. The longitudinal layer alone was infiltrated with numerous tubercular nodules which, separating the muscle fibre, were continuous with the sub-mucosa. The sub-serous connective tissue stratum was also hypertrophied but free from tubercular lesions.

In conclusion, then, this is a rare form of tuberculosis. This hypertrophied form has been frequently met with in the region of the coecum, but in the small intestine only twelve cases have been recorded. The connective tissue hypertrophy (better, hyperplasia) may be due to attenuation of virulence of the bacillus. As to the muscular hypertrophy, it is due to exaggerated functional activity of the intestine in its efforts to overcome the resistance offered by the stenosis to the passage of intestinal contents.

SECONDARY BLOOD INFECTION IN CHRONIC, ULCERATIVE, PULMONARY TUBERCULOSIS.

(By Professor Pierre Teissier of Paris.)

Since 1894 we have examined by Straus' method the blood of fifty-three patients suffering from chronic, ulcerative, pulmonary tuberculosis and, sometimes, also from ulcerative, intestinal tuberculosis. The blood taken in certain cases some time, and in others shortly before death, was distributed among six to ten culture tubes (gelatin and bouillon) in unequal proportions—in some of the tubes the amount being limited to one or two drops.

In those fifty-three cases we have proved the presence of micro-organisms in the blood; twice strepto-coccus pyogenes aureus, four times strepto-coccus pyogenes albus and three times other strepto-cocci. The development of cultures was most frequently slow, requiring from three to five days (in exceptional cases three) for the appearance of one or two small colonies in those tubes in which the fractional proportion of blood was small.

This signifies that the microbic units were somewhat variable and that there was, according to the justified opinion of Beco, an accidental blood invasion and not a condition of septicaemia.

However, if in the majority of cases this invasion remains inoffensive it is possible, owing to the depleted condition of the organism and the action of the bacillus and its products, that such an invasion may lead to a veritable condition of septicaemia or pyaemia.

The observations of post tubercular septicaemia by Pasquale, Rudder, Cornil, Babes, etc., of vegetative endocarditis; of secondary infection in tubercular subjects by Raustan, Guyon, etc.; of arteritis by Vagrey; of phlebitis by Sabrozes and others, are sufficient confirmation thereof.

[The method of Straus for obtaining blood from the patient consists merely in pricking a superficial vein of the forearm under antiseptic conditions.]

EARLY DIAGNOSIS OF TUBERCULOSIS BY SERO-AGGLUTINATION.

(By Drs. S. Arloing and Paul Courmont of Lyons.)

The authors present a resume of observations and of practical applications which they have pursued during two years. The number of subjects on whom they have practiced this sero-reaction is 352, and these are classified clinically as follows:

Tubercular patients	191
Non-tubercular patients	130
Subjects apparently sound	34

On the strength of these statistics and of the confirmed observations made by several authors, they formulate the following general conclusions:

1. The use of pure cultures, in glycerinated bouillon, of the bacillus of human tuberculosis, has enabled us to make researches for the agglutinative power of the humors, and chiefly of the serum of tubercular subjects, and to arrive at the sero-diagnosis of tuberculosis.

The precautions and details of technique for obtaining the proper liquid cultures are very minute but indispensable. We have indiciated them at length elsewhere.

2. In cases of tuberculosis which are but little advanced the agglutinative power of the serum is almost constant, but at diverse degrees it varies from 1-5 to 1-20 and even more.

In grave cases, acute and those of extensive lesions, the sero-reaction is very feeble and frequently fails entirely.

The agglutinative power in tubercular subjects appears most frequently to be in inverse ratio to the gravity of the affection or to the extent of the lesions.

3. In patients, subjects of diverse affections and in whom examination reveals no certain signs of tuberculosis, the sero-reaction, in a large number of cases, discloses the existence of a latent tuberculosis. Autopsy or ulterior development of the disease frequently brings evidence of confirmation to the sero-diagnosis.

4. Also in subjects apparently sound the agglutinative reaction,

most frequently absent, is positive in a certain number of cases—this corresponds to that which one knows of latent tuberculosis.

5. Consequently in practice a positive sero-reaction in a suspected subject will be of great value in establishing the existence of a visceral tuberculosis. A negative sero-reaction will be of less value since the agglutination often fails in certain tubercular subjects.

But since the sero-reaction is mostly absent in advanced cases where one has no longer need of sero-diagnosis, it can in certain of these cases confirm an unfavorable prognosis. On the contrary, in a subject suspected of tuberculosis, but without clinical signs and without symptoms of gravity, the absence of agglutinative power appears to be of great value in the elimination of that affection.

6. In conclusion, the sero-reaction appears to us to be a rapid process inoffensive to the patients and of great value in the diagnosis.

DIAGNOSIS OF POTTS' DISEASE IN THE ADULT.

(By Dr. Armand Siredey of Hospital St. Antoine, Paris.)

In youth the lesions of tuberculosis rapidly invade the vertebral discs and provoke their destruction; early deformities and abscesses making the diagnosis easy.

In the adult, the evolution of the disease is slow and insidious and gives place to complications, of which the nature is for a long time unknown. Here, as well as in the child, the vertebral lesions are often the first apparent manifestation of tuberculosis. Instead of being diffuse, the lesions present the form of small circumscribed areas, limited to a small portion of the body, the laminae and the apophyses of one or several vertebrae, without gravely compromising their solidity. The gibbosity is often missing, and the alterations of the spine remain for a long time so slight as to be unperceived. The little cavities and superficial erosions of the external surface of the vertebrae eliminate small caseous masses and droplets of pus which are surrounded by a thick, fibrous resistent capsule, analogous to that which is developed in the neighborhood of the dura mater when the same process occurs around the spinal canal.

As the pus accumulates beneath this fibrous membrane the latter dilates and thickens and accompanies the "ossifluent" abscess in its progress into the tissues. When the abscesses are minute they remain joined to the vertebral column, always surrounded by a very dense fibrous capsule, thus forming irregular trails comparable to drops of wax which flow down the side of a candle.

This false membrane is intimately adherent to the surrounding tissues. By compression of the spinal nerves it produces neuritis with intense pains, and gives rise to trophic and various motor disturbances.

The thickening of the cellular tissue extending well beyond the vertebral lesions, when these have escaped a minute exploration, provokes such intense pains that one is often tempted to attribute them (the pains) to alterations of the neighboring viscera. It is thus that the neuralgic crises which supervene in the thoracic region may be confounded with symptomatic complications of pulmonary congestion, pleural and pericardial extravasation, from which it is easy to distinguish them by the absence of characteristic physical signs. These neuralgic crises also sometimes suggest aneurism of the aorta, but they are neither accompanied by circulatory disturbances, nor by phenomena of compression of the mediastinum.

More frequently when situated in the region of the lower intercostal spaces, they are attributed to the kidneys; this is the most habitual error. The acute paroxysmal crises are taken for nephritic colics, and the dull, permanent prolonged painfulness leads one to believe in the presence of calculi in the bladder. The absence of modifications in the urine constitutes here an important element of diagnosis. Limited to the abdomen and bladder, these pains have been confounded with tubercular peritonitis (Peter) or with utero-adnexial affections in women. When the crises give rise to sciatic neuralgia, they are often considered as essential neuralgias, called rheumatic; and they have been taken, when very intense, for the pains of tabes. This last error is easily avoided, for, far from being abolished, the reflexes are generally exaggerated, and most of the signs of ataxia are in default. Often these painful phenomena are wrongly attributed to simple necrosis, although the patient does not present the principal stigmas of it.

Besides these negative signs which enable the diverse visceral affections to be eliminated, as well as neuroses and certain general maladies, the diagnosis can be supported by positive signs of real importance; the persistence and intensity of these neuralgias, their fixity, their resistance to therapeutic measures, the progressive extension of the painful phenomena to new nerve branches in a horizontal direction, and, above all, the exaggeration of the tendon reflexes of the diseased side, constitute already an ensemble of presumptions of a spinal lesion.

A minute examination of the vertebral column will prove to a greater or less degree a persistent pain at a fixed point, in the region of the spinous or transverse processes, of the laminae, or of the bodies of the vertebrae; it will also prove an abnormal projection of one or of several processes, more often, the immobilization of certain vertebrae when one attempts to impart the movements of flexion or of extension in the antero-posterior or in a lateral direction.

At length, the spinal origin of the lesion being recognized, its nature will be easier to determine. Fever frequently accompanies vertebral tuberculosis, but may also be absent. Its absence is the rule in cancer or syphilis. The previous personal and family history will have great importance.

The existence of previous tubercular lesions, in the patient, in his antecedents, in his descendants, or in persons living with him, will incline the diagnosis toward tuberculosis.

Carcinoma and sarcoma are never, so to speak, primary in the spinal column.

If, as regards syphilis, there remains some doubt, the trial of intense specific treatment can be made.

THE INFLUENCE OF AN EXCESSIVELY SACCHARINE ALIMENTATION IN THE INFECTION OF TUBERCULOSIS.

(By Dr. M. L. Guinard of Lyons.)

Sixty guinea pigs were infected with the product of a culture of tubercle bacilli on potato and were divided into two groups of thirty. The animals of each group received exactly the same food, but to the rations of each of the thirty pigs of one group a dose of from ten to twelve grammes of sugar per diem was added. During the course of the experiment the alterative examinations of these animals showed that those which ate sugar weakened much more rapidly than the others, and that with them the disease seemed to progress with still greater severity. One month after inoculation thirty of the animals, fifteen of each group, were injected with 1-15 c.c. of crude tuberculin. During the 24 hours following the injection fourteen animals died, of which eleven belonged to the group which had been given sugar.

Forty-eight days afterward as a result of successive deaths there remained but thirty-one of the sixty which had been inoculated with tubercle bacilli—twelve of the series which received sugar, nineteen of the others.

To twenty-nine of these tuberculous animals, including the twelve sugar fed, a second 1-15 c.c. of tuberculin was given. During the first six hours following nine died, of which seven were of the sugar-fed series. Affairs progressed in this fashion until, during the next 12 hours, 18 hours after injection, there were twenty-two dead, including all of the twelve which had received sugar. Autopsy revealed existence of tuberculosis in all.

In another experiment two dogs were inoculated in the lung with tubercle bacilli. One received each day, in addition to his food, 240 grammes of sugar. In fifty-eight days the sugar-fed dog had lost in weight nine and one-half kilogrammes. He was very thin while his companion, in better condition, had lost only three and one-half kilogrammes. After a positive proof of tuberculosis by the tuberculin test both were killed and both were found to be tubercular. But while the sugar-fed dog had only a tuberculosis of the pleura and the lungs, localized, the other had extensive pulmonary, pleural, ganglionic, hepatic and renal tuberculosis.

These experiments are part of a series which are being made and which will be pursued and completed by numerous tests.

One can clearly remark that in this influence of sugar, the question of food is not agitated, but that it is a question of the modification of organic tissue by a special food given in excessive doses to animals which do not work and which are infected.

Granted, that which is already known of the favorable influence of azotes on the resistance of organic tissue to tuberculosis (Richet and Herricourt) the experimental facts which definitely demonstrate the contrary influence of the carbo-hydrates and sugars will be the less surprising since they are in perfect harmony with the clinical observations of the gravity of tuberculosis in diabetics. It must not be forgotten that during the progress of an affection and in proportion to the influence which over-feeding may have upon it, great stress should be laid upon the kind of food which incontestably can play an important role in predisposing the tissues favorably or unfavorably.

TREATMENT OF EXPERIMENTAL TUBERCULOSIS BY MUSCLE PLASMA, OR ZONO-THERAPY.

(By Professor Charles Richet of the Faculty of Medicine of Paris.)

The experiments which I have undertaken in collaboration with Dr. J. Herricourt have given me the following results:

1st. Although the dogs infected experimentally with tuberculosis died without exception, the dogs nourished with raw meat never died, although infected in the same degree and under the same conditions as the others. Of about 500 dogs which I have infected with tuberculosis, during twelve years not a single one survived more than six months, whatever the mode of treatment employed, while of sixteen dogs nourished with raw meat only three died. I have actually in my laboratory three tubercularized dogs, one of which has survived two and one-half years, and two others which have lived eighteen months (these on raw meat).

It cannot be said that this raw meat alimentation hinders the development of tuberculosis, for the raw-meat dogs that died were tubercular; but this special alimentation prevents the intense development of tuberculosis and removes from the disease its characteristic of rapid intoxication.

2d. The active principle of the meat from a therapeutic point of view can be separated. It is the muscle plasma. If one treats beef so as to extract from it the liquid parts, one obtains a soluble part, the muscle plasma, and an insoluble part, the muscle fibre. It is in the muscle plasma that the active antitoxic element exists; for the tubercularized dogs fed with this plasma resisted as well as those nourished with the raw meat IN TOTO, while those nourished with the muscle fibre wasted and deprived of its plasma, resisted badly.

With a powerful hydraulic press (100 kilos per square centimeter) about 350 grammes of plasma may be obtained from 1000 grammes of muscle.

3d. Cooking destroys the active principle of the meat and of the plasma. It is also quite probable that dogs fed exclusively on cooked meat die sooner than those nourished with ordinary food (fat, soup, meat and bread).

4th. It is not possible to attribute this protection of tubercularized dogs to over-feeding, because:

(a) Dogs fed with cooked meat and overfed, die as quickly as the others.

(b) The quantity of plasma which suffices to prolong the life of a tubercular dog or to prevent his death is very small from a nutritive standpoint. It represents in albuminous matter only three grammes a day for a dog ten kilogrammes in weight—an insufficient quantity to be considered as over-feeding.

(c) Dogs nourished with muscle plasma before infection maintained for two, and often for three and four months, a remarkable immunity to tuberculosis, which disappeared in time, but which one cannot explain on the grounds of over-feeding, for from the time of infection they were fed just as the other dogs which did not resist.

(d) Dogs in a state of "hypo-alimentation" (under-nourished) but given muscle plasma with a dose of azote quite inferior to the normal dose resisted longer than those in a state of "super-alimentation" (over-fed) which received no muscle plasma.

(e) The necessary and sufficient quantity for preventing the development of tubercular infection is, at least for a dog of ten kilos, 120 grammes of meat, or forty grammes of pure plasma. By plasma is meant the juice obtained by the pressing of the meat without the addition of water.

(f) Muscle plasma intra-venously injected is an extremely toxic liquid, of which doses of 4 c.c., sometimes of 3 c.c., and even 2 c.c., kill in less than 24 hours. The animals die, with the blood but little coagulable, of hepatic and intestinal haemorrhages with a bloody exudation into the peritoneal cavity, and sometimes of convulsions and coma.

Therefore the stomach (or perhaps the liver) transforms the toxic substances contained in the muscle plasma into inoffensive ones.

(g) Even in extremely sick dogs and in those almost dying the use of muscle plasma has rapidly re-established the forces and brought about the cure. In certain cases the dogs were so feeble that it was necessary to administer the plasma by means of the oesophageal tube. I have in my laboratory two dogs treated thus "in extremis" and which are at present in a flourishing state of health.

(h) Experiment has proven that if the raw meat alimentation is suspended the tubercular affection becomes in two to three months newly dangerous; and consequently, that this alimentation should be prolonged during an extensive period and that it can only be suspended during short periods of time.

(i) Although these conclusions have entirely resulted from animal experimentation, and although it does not remain for me to pursue the application of these principles in human subjects of tuberculosis, I believe in formulating the following indications and probabiliteis which may, perhaps, be useful for a physician to know:

1st. It is not necessary to await the development of grave digestive and nutritive disturbances before giving the raw meat or muscle plasma to patients suffering from tuberculosis. The sooner this treatment is applied the greater are the chances of complete recovery inasmuch as the zono-therapy does not act as a super-alimentation but as an antitoxic agent.

2d. Raw meat acts more efficaciously than plasma; plasma more so than the dry extract; but in following the cases it is interesting to combine the three pharmacological forms in order to cause an absorption as great as possible of the active principle.

3d. Approximately proportioning per kilo of weight of man that which is true per kilo of weight of dog, one may estimate for a man of sixty kilos the necessary quantity of meat at 600 grammes; the quantity of plasma may be estimated at the amount of plasma which can be extracted from 1200 g. of raw meat; and the quantity of dry extract in the ratio of sixty grammes to two kilos of raw meat. It must always be remembered that plasma is a fluid extremely subject to alterations and consequently it should be used as soon as extracted.

4th. It is probable that the plasma is most active when extracted from meat without the addition of water. This consideration is still more important because the active principle must not be diluted with too great a quantity of water.

5th. In conclusion, that which is of the greatest importance for the exact comprehension of this principle is that the raw meat or plasma acts by the antitoxic elements it contains, elements which in an efficacious manner combat the tubercular intoxication.

TREATMENT OF TUBERCULOSIS BY MEANS OF SUBSTANCES EXTRACTED FROM THE HORSE.

(By Dr. Boinet, associate professor in the College of Medicine of Marseilles, corresponding member of the Academy.)

1. It is probable that animals such as the goat, the dog and the horse, which in normal condition are quite resistant to tuberculosis,

owe in part this relative immunity to the protecting substances contained in their blood. It is, therefore, logical to suppose that the administration of these products in tuberculosis cannot but have a favorable effect upon the evolution and progress of that affection.

2. We have tried to isolate these substances by means of fractional precipitation with sulphate of ammonium, the proceeding which enabled Ide and Lemaire (Archives de Pharmacodynamie, Vol. VI, page 477) to show that all the specific activity of the anti-diphtheritic serum is found concentrated in the group of albumins capable of precipitation by ammonium sulphate (between 26 and 44 to 100).

In treating by this process large quantites of horse serum, one obtains on the filter a white precipitate, without marked odor, from which the excess of ammonium sulphate is removed either by washing or by dialysis.

3. The product thus obtained is dried at 37° C. and given to the tubercular patients in the form of wafers. This substance has not a disagreeable taste, and is well supported.

Its absorption causes no inconvenience. Employed in the dose of 50 centigrammes per diem, it has produced in twelve tubercular patients (hospital service) a certain symptomatic amelioration.

These therapeutic trials are not yet sufficient to allow of general conclusions.

This communication has for its object the provoking of researches in this sense.

THE REST CURE IN PHTHISIS.

(By Dr. Samuel Bernheim of Paris.)

Dr. Bernheim declares that this therapeutic agent, employed for several years in sanitaria, should no longer be considered as empirical.

He gives the following scientific interpretation of it:

1st. In the treatment of the phthisical patient the rest cure is the indispensable complement of a sojourn in a salubrious climate and of forced alimentation.

2d. Since the lungs participate in all excessive activity, the effect produced is an active congestion in the region of the tubercular focus, and often new tears in old adhesions. It is for this reason that one so often observes in tubercular subjects haemoptysis, thoracic pains or the unexpected occurrence of pneumo-thorax after any effort whatsoever.

3d. Every organism which fatigues, suffers more abundant organic losses (increased katabolism). These losses are still more augmented in the phthisical subject who, when over-exercised, as the consequence of fatigue, mobilizes his bacilli, whence comes a veritable auto-intoxication which evidences itself by febrile phenomena.

4th. Forced feeding and life in the open air are of profit to a tubercular patient only when he is placed under conditions of absolute repose. Here we have still another reason for nutritive economy.

5th. Furthermore, repose plays another important role; it prevents the general localization of the bacillus of Koch.

6th. One should therefore prescribe the rest cure for every phthisical patient who has fever and in whom one observes clinical symptoms of tubercular activity. One should not permit exercise until after the disappearance of these active symptoms, and even then the patient should remain for a certain time under the most stringent medical surveillance.

7th. This rest cure may be practiced in all cases, provided that it is applied in a disciplinary manner, and provided there are no violent winds, nor bacilli-containing dusts in that climate.

TREATMENT OF LARYNGEAL AND PULMONARY TUBERCULOSIS BY ANTISEPTIC INHALATIONS OF MENTHOL-BROMO-FORMOL.

(By Dr. P. Lacroix of Paris.)

I desire to present to the Congress a series of clinical observations. They show the results which I have obtained, during four years, in applying to 475 cases of laryngeal and pulmonary tuberculosis the new therapeutic method which I last year had the honor of presenting successively to the Congress of the British Medical Association and to the Academy of Medicine, where it has just been the subject of a report by the President, Labordie. This process consists in inhalations of a medicated antiseptic gas obtained by passing a current of air through a mixture treated in closed vessels, of menthol, formaldehyde and bromoform. Experimentally this gas sterilizes pus and destroys the virulence of Koch's bacillus. Practically it can always be inhaled with advantage because it is perfectly tolerated and because the laryngoscope shows that it always acts favorably upon the respiratory passages. Clinically it penetrates by physiological inspiration into the laryngo-bronchial cavities, which it disinfects in all their permeable parts.

Amongst the 475 case-observations which I have actually made with this method, a certain number are particularly interesting. Here are in the first place 95 cases of beginning laryngeal and pulmonary tuberculosis whose cure was obtained and maintained by antiseptic inhalations of menthol-bromo-formol assisted by appropriate hygiene. Here also are two cases of tubercular ulceration of the larynx which have cicatrized under the influence of this treatment, although they had resisted obstinately other medications. I signalize equally a focus of dry crackling rales which was cured after a treatment of one month.

After having enumerated these successes in order to specify nicely the indications of the method, I ought to add that the efficacy of the latter notably depends upon the progress of the affection. When the infiltration of the laryngeal mucosa has gained in thickness and when crackling and moist rales have appeared in the chest, the antiseptic gas does not come so directly in contact with the lesions. In advanced cases it ceases to be curative in the same degree, although it is still possible to extend its action in the following manner, viz., by injecting hypodermically guiacolated oil in order to favor expulsion of expectoration and to permit the gas to come in more direct contact with the tubercles. However, the rapid acute forms of tuberculosis (the galloping consumption) which run a course of a few months are beyond the reach of this medication, as of all others without exception.

In a word, the method of antiseptic and curative inhalations of menthol-bromo-formol is a treatment of the first rank, first, when it is employed at the very beginning of the bacillary infection of larynx or lung, when the laryngeal mucosa is but superficially invaded and the pulmonary alveoli are still permeable; second, when employed in cases of essentially chronic and long duration in which the bacillus plays so great a role.

INTENSIVE GUAIACOLIZATION IN PULMONARY TUBERCULOSIS.

(By Drs. Weil and Diamantberger of Paris.)

We are the first in France to employ guaiacol in subcutaneous injections. For eleven years our tests have been multiplied and perfected until today we possess statistics of more than 500 cases of pulmonary tuberculosis which have been treated and considerably ameliorated by the methodic use of guaiacol. The constant failure of practitioners who employ this medicament is due to:

1st. The inferior and variable quality of commercial guaiacol. We use synthetic crystallized guaiacol, a very antiseptic and anaesthetic substance, entirely freed from toxicity. One can give a dose of one to three to four grammes per diem without danger of reaction or intoxication.

2d. The small quantities given.

The formulas of Picot and of Pignol of 1, 2, 3 and even 5 grammes are entirely insufficient; the more so since are added, iodoform which causes diarrhoea, eucalyptol which is irritating and carbolic acid which is caustic. We employ a solution of equal parts per following prescription:

Guaiacol, crytallized.
Sweet-oil of almonds aa 10.
Sterilized at 120° C.
Chloro-hydrate of cocaine 0.20
F. s. a. in vitro nigro.
Sig: For hypodermic or intra-muscular injection.
Give daily an injection in the gluteal region of one cubic centimeter.

We administer in addition to these hypodermic injections:

(a) Poultice of the same solution on the different parts of the thoracic wall, over a surface of from eight to ten square-centimeters; applied every night.

(b) Bathing with 100 grammes of tepid milk, to which are added forty to fifty grammes of the same solution.

(c) Pills as follows:

Crystallized guaiacol 0.01
Crystallized terpine 0.02
Benzoic acid 0.03
Ext. of Belladonna
Ext. of Henbane aa. 0.001
For one pill, make 100 pills.
Sig: One every three or four hours.

This intensive guaiacolization (daily injections, in connection with hygienic and dietetic treatment) should be continued several months, with intervals of eight to ten days (suspension of treatment) every three weeks.

The symptoms which are most benefited by this medicament are, in order of importance, expectoration (quantity and foetor), diminished cough, haemoptysis, fever, night-sweats, diarrhoea and general debility.

Intensive guaiacolization is indicated in all forms of pulmonary tuberculosis, in chronic bronchitis with profuse expectoration, in pulmonary gangrene, and in intestinal tuberculosis.

THE VALUE OF SURGICAL INTERVENTION IN URINARY TUBERCULOSIS (REPORTS AND DISCUSSIONS IN SECTION OF URINARY SURGERY).

Dr. Lavaux of Paris:

"I see with pleasure that the opinion which I have held for more than ten years after Conheim and Cayla is today almost unanimously admitted. It is indeed in the kidney that tubercular infection starts in the great majority of cases. All the distinguished orators whom we hear, extol early nephrectomy in the treatment of renal tuberculosis. Is this logical? Here are patients predisposed to tubercular affection; it is admitted that in them there exists previously at some point in the organism a primary focus of tuberculosis; and since tuberculosis has attacked one kidney, it is proposed to us to admit that nephrectomy is immediately indicated. Who will prove to us that in the tubercular subject who possesses somewhere a tubercular centre and whom the suppression of one kidney will put in a manifestly inferior physiological state, who will prove to us, I repeat, that the tubercular infection will not invade in its turn the kidney hitherto considered as healthy? In several weeks, perhaps months, at most a year, will we not verify in the predisposed subject a new urinary tuberculosis? I am waiting to see so hazardous a proposition supported by clinical facts of undisputed probity, in numerous cases of nephrectomy practiced under these conditions followed by cures verified five, ten and even fifteen years after the operation. But nothing of the kind has been presented to this Congress.

"There is another reason why I reject early nephrectomy. It is the actual power of medical treatment employed alone or aided by minor surgical operations in cases in which vesical is united with renal tuberculosis.

"Dr. Saxtorph (Copenhagen) rejects the use of nitrate of silver in the treatment of tubercular cystitis. On this point we should be explicit. If it is a question of strong caustic solutions of nitrate of silver I am of his opinion, the contra-indication is usual. But if it is a question of solutions of the strength of 1 to 1000, or even 1 to 2000, and if one is careful to inject them without a sound after direct anaesthesia of the mucosa of the inferior urinary passage, nitrate of silver in certain cases can give excellent results. I have published a certain number of cases which prove how rare are today the indications for surgical interference in vesical and renal tuberculosis."

* * *

Dr. Casper of Berlin:

"In tuberculosis of the kidneys there is no better method of making a sure and early diagnosis than that of catheterization of the ureter. I have published the first case in which I succeeded in finding Koch's bacilli in urine taken from the kidney. In order to make a precise diagnosis, it is necessary to compare the urine of the two sides taken by catherization of the ureters, and to note: first, quantity of urine; second, molecular concentration; third, amount of sugar eliminated after the injection of fluoriozine. The molecular concentration is always diminshed on the diseased side. The quantity of sugar is also diminished on diseased side. I find that methylene blue does not give as sure indications as does the fluoriozine test. There is between the two substances this difference, that the blue is eliminated by the kidneys as well as many other substances, but the sugar is produced by the kidneys. The quantity of fluoriozine injected being five milligrammes, there is more than one gramme of sugar eliminated. This examination has permitted me to avoid a nephrectomy which would have proved grievous to the patient who had a right renal hematuria, and in whom I discovered that the left kidney was also diseased."

* * *

Dr. Mankiewicz of Berlin:

"I do not find that in vesical tuberculosis the pain and polyatruria are ameliorated and cured by washings with boric acid. The washings are not tolerated; they produce distension, pain and haemorrhages. The evacuation of the vesical residue will be useful, but as few instruments as possible should be introduced into a tubercular bladder. The best medication is sublimate in solution, varying in strength from 1-1000 to 1-10,000, by instillations of 5 c.c., according to the method of Guyon or Casper."

* * *

Dr. Carlier of Lille:

"I believe that one should not always rely upon the methylene blue test for determining the value of the supposed healthy kidney when it is proposed to remove the tubercular kidney. I have just performed nephrectomy in a patient in whom the very conclusive tests of blue and chemical analysis of the urine had led me to believe in the integrity of the other kidney. This patient has since died of aneurism, and the autopsy reveals the fact that the kidney which I had left was gravely affected. I agree with Dr. Albarran that it is not necessary after a nephrectomy to prolong the operation in order to remove the ureter in its entirety."

* * *

Dr. Nicolich of Trieste:

"I have operated on six patients for renal tuberculosis, all by nephrectomy, with one death and five recoveries. I am convinced of the utility of catheterization of the ureter, which I have practiced in all the cases in which it was possible for me to do so.

"It is not necessary to prolong the operation in order to do ureterotomy, even if the canal is tubercular. A patient operated on eight months ago is very well and had not a single fistula, although I was obliged to leave the tubercular ureter in place."

PULMONARY TUBERCULOSIS—ITS TREATMENT BY A NEW TUBERCULIN.

(By Dr. Ponzio of Paris.)

Gentlemen:

Whatever may at present be the actual opinion of the medical profession on the serum, toxins, and tuberculins employed against tuberculosis, I feel justified in calling your attention to the results which several of my colleagues and I have obtained in the treatment of tuberculosis by a new tuberculin which I have prepared in my laboratory.

In order to demonstrate to you the essential difference existing between this tuberculin and the product of the same name which has not responded to the hopes which it gave birth to a few years ago, allow me to indicate to you the technique of my preparation.

The bouillon for cultures made according to the formula:

Beef	500	grammes.
Dry peptone	30	"
Neutral glycerine (neutralized at 30°C.)	58	"
Distilled water	1000	"

Is neutralized by means of bi-carbonate of soda. After filtration and sterilization, the bouillon flasks are infected with pure cultures of human tuberculosis, and placed at once in an incubator at 38°C., where they remain during the entire time necessary for the development of cultures of medium intensity.

I insist on that medium intensity because that is a capital point in my preparation which I consider as a rule never to be deviated from.

Arriving at this degree of intensity, the cultures are treated in the sterilizer to 110°C., first filtered through paper and then through porcelaine under pressure. Finally the fluid (filtrate), by concentration in a vacuum, is reduced to 8 per cent. of the volume of bouillon primarily used.

To a volume of tuberculin thus obtained, is added nine volumes of a mixture of equal parts of distilled water and neutral glycerine. This mixture is submitted to the action of an apparatus which imparts to it an energetic shaking in a horizontal direction. (The shaking is for the purpose of securing a more complete mechanical mixture.)

This product is termed tuberculin No. 0, and serves solely for the preparation of successive degrees of concentration at 1-10, 1-100 and 1-1000. These I designate by the numbers 1, 2 ,3, and these I administer in the treatment of pulmonary phthisis in hypodermic injections of 2 c.c.

The first trials of this tuberculin were made with guinea pigs. In tubercular animals the injections of 2 c.c. did not produce a rise of temperature; the local processes at the point of infection generally remain stationary. In the internal organs the infection was slowly propagated. The animals even gained flesh during the treatment and they always survived the controls by several weeks.

In the tubercular human subject these injections produce no pain, local reaction, nor general phenomena.

The treatment should in all cases invariably be commenced with a series of six injections of No. 3, continued by twelve injections of No. 2, and followed finally by injections of No. 1, during the time necessary for the cure of the patient. This time has never exceeded one year in the cases treated by my colleagues or in those under my care.

Thus administered, this tuberculin acts without reaction by the continuance of its use; and with much more rapidity and efficacy the earlier the treatment is begun.

These cures I have obtained with those of my colleagues who have adopted this treatment in all cases of chronic pulmonary tuberculosis of slow progress, at all stages and in all degrees of severity.

But if I affirm the cure for chronic tuberculosis (pulmonary) I cannot as yet for acute phthisis. I state this in order to prevent disappointment to those of my colleagues who would make the trial, that my tuberculin has produced but passing amelioration in acute cases. However, this reserve should not diminish the confidence which this treatment deserves for cases of chronic tuberculosis for which it was designated.

The author appends reports of thirty-five cases treated by his new tuberculin.

[The necessity and utility of many of the steps of manufacture are not clear. A calculation of the degree of concentration, dilution and redilution shows the beginning dose, 2 c.c., to be not quite the equivalent of 0.5 milligrammes of Koch's old tuberculin—which latter dose is also rarely followed by a reaction.—Ed.]

REVIEW OF CURRENT LITERATURE.

PRIMARY ISOLATED TUBERCULOSIS OF THE PATELLA.

Gross (Rev. med. de la Suisse Romande, Mar. 20, 1900) has published a monographic sketch of this subject which is based upon a study of 30 cases from literature, to which four personal instances are added.

Trauma is frequently an exciting cause; either sudden violence or sustained irritation. All periods of life seemed to be affected to a degree nearly equal.

This subject has been monographically treated twice before, viz.: by Menard in 1896 (Tuberculose primitive de la rotule. Congress franc. de chirurgie), and by Francois in a These de Lyon, 1888 (Des osteites tuberculeuses primitives et isolees de la rotule). The present study is in fact hardly more than a recapitulation of these two articles.

We reproduce in abstract one of the author's four cases:

Patient a women in her twenties. Consultation May 12, 1898. In May, 1897, she was operated upon for tuberculous cervical lymphoma, and the sinuses are still discharging. In the following September she noticed pain in the left knee, with increasing size of the joint and formation of fistula. Walking became difficult. In January, 1898, secondary abscess over left external malleolus opened.

Diagnosis of tuberculosis of patella. Double apex catarrh coexists.

Operation April, 1898. Incision along fistulous tract. The entire lower half of the patella scraped out, leaving but a small bridge of bone connected with the ligamentum patellae. Joint opened, synovial fluid allowed to escape. Temporary recovery with good functional use of limb. The focus in the foot became worse later, so that it became necessary to amputate in the course of the leg. Knee joint then sound. It was learned later that patient was far advanced in phthisis, and had submitted to an amputation of the thigh.

The author's conclusions are as follows:

1 Primary tuberculous osteitis of the patella is of much more common occurrence than is usually supposed.

2. Attention has only been called to this lesion within a comparatively recent period.

3. The lesion is severe in character, and tends to rapidly involve the knee-joint.

4. If an early diagnosis can be made, an operative cure may be effected by any one of several methods of intervention, viz.;

(a) Curettage of the focus of disease.

(b) Ablation of the patella with or without synovectomy. This operation is admissable in most cases in adults.

5. The patella may be abolished without doing away with the functions of the knee-joint.

6. The patella may be completely reproduced after ablation done by the subperiosteal method.

LESIONS OF THE THYROID GLAND IN TUBERCULOSIS.

Professor Roger, assisted by Dr. Garnier, has prepared a very thorough study of this subject for the Arch. gen. de med., April, 1900.

The authors state that there are two widely different types of lesion of the thyroid in tuberculosis, due respectively to the bacilli and toxins.

The bacillary lesions—true thyroid tuberculosis—are relatively rare occurrences. The first example in literature was published by Lebert in 1862. Twenty years later Woelfler wrote the first monograph on this subject.

Chiari investigated 100 cadavers of tuberculous subjects for lesions of the thyroid and obtained positive results in 8 per cent. of cases, while Fraenkel got a percentage of 12 under the same circumstances. The present authors examined 16 cadavers and got positive results in two cases.

Most of the reported cases have been in young subjects, including numerous infants.

Is thyroid tuberculosis ever primitive? There are a few undoubted cases on record (Weigert, Schwartz). In the great majority of instances the organ is secondarily affected. In addition to the circulatory route, infection may take place by contiguity (tuberculous lymph glands, cervical Pott's disease).

Thyroid tuberculosis occurs in ordinary phthisis, and still more frequently in general miliary tuberculosis—in both cases infection occurs by the blood route. Numerous clinical types have been recorded, including the so-called tuberculous goitre or surgical thyroid tuberculosis, which may cause pressure lesions. In a second clinical type there is little or no alteration in the naked-eye appearance of the gland, but section shows that infiltration and softening have occurred. We have two corresponding forms of miliary tuberculosis, in one of which the lesions are visible macroscopically, in the other, microscopically. We may find two or more of these types combined in the same case.

Of the author's two cases, one was in a nursling who had general miliary tuberculosis; microscopical examination revealed a few granules in the thyroid. The other patient had ordinary pulmonary phthisis with secondary implication of numerous viscera, including the thyroid.

Of much more frequent occurrence is the sclerous transformation of the thyroid in tuberculosis; in fact, this phenomena is of almost constant occurrence (eleven out of twelve cases). It is possible that the tachycardia noticed in early phthisis is due to a hyper-excitation of this gland. Cases have been published which appear to bear out this conclusion.

This sclerosis may be of atrophic or hypertrophic type. From results of animal experiment, the authors have no doubt that the sclerogenous action is due to the toxins of the bacillus.

The authors appear to believe that this sclerous transformation is a conservative attempt of nature to destroy the thyroid cell which under the influence of the tuberculous toxine generates a special vascular poison causing the tachycardia.

RELATIONS BETWEEN TUBERCULOSIS AND HEART DISEASE.

Potain (Jour. de med. et de chir., April 10, 1900) says that this relationship has been variously set forth by different authors. Statistics have rather tended to confuse the subject. While a small heart is the rule in consumptives, the very opposite may be encountered. We need a more careful analysis of the relationship which subsists between the heart and the tuberculous lung. For example, it must be borne in mind that stenosis of the pulmonary artery, however provoked, is in itself a direct predisponent to pulmonary phthisis. Again in uncomplicated mitral stenosis one-half the victims are tuberculous.

Having eliminated examples of this sort, in which cardiac lesions appear to invite consumption, we turn to the cases in which tuberculosis antedates the cardiac trouble. We know that the tuberculous process may directly attack both the myocardium and endocardium, but these localizations are extremely rare. It is more common to find a pneumo- or strepto-coccus endocarditis as an epiphenomenon in extensive tuberculosis. There is a very common accident in phthisis known as sclerous endocarditis in which no bacilli are found. The valves, especially the mitral, are attacked, and Potain appears to believe that the uncomplicated mitral stenosis already alluded to may result from this type of sclerous endocarditis. The apparent lack of agreement in his statements about the relationship of mitral disease to phthisis is doubtless attributable to the general obscurity which invests the entire subject. First mentioned as a something which may invite tuberculosis, it is later spoken of as a result of an endocardial lesion of presumably tuberculous origin. At any rate, there is no disputing the frequency of association of the two conditions.

This mitral lesion is practically never seen in acute tuberculosis, while it is relatively common in the attenuated so-called fibroid phthisis. It is interesting to note that with fibroid phthisis and sclerous endocarditis we not infrequently find a general sclerotic tendency, while the victims of this syndrome are often frankly arthritic.

Autopsies show that this mitral lesion is often overlooked. With regard to prognosis, the valvular affection may be either stationary or progressive. Cases have been seen in which the lung trouble appeared to become latent while the cardiac lesion progressed rapidly, until the patient died of asystole.

FAT CONSUMPTIVES.

Under this paradoxical title (Les phthisiques gras) Professor Lemoine of Lille discusses (La Semaine Medicale, March 28, 1900) that type of pulmonary tuberculosis in which the victim retains an appearance of health, his natural color, his vigor and especially his embonpoint. Although such patients may cough and expectorate profusely, and may exhibit slight elevations of temperature and night-sweats, the medical man is loath to asssociate these symptoms with such a disease as tuberculosis, as long as anaemia, emaciation and lack of vigor are not collaterally in evidence. Nevertheless careful physical exploration will show that these patients may be in the second and even in the third stage of phthisis.

This pathological paradox is not a new discovery, but has been noted by the great phthisiologists of the past. Laennec, for example, mentions the persistence of the general health and plumpness in certain cases of phthisis which were sufficiently far advanced to exhibit pectoriloquy on physical examination. Franck speaks of profound alteration of the lungs with no suspicion of ill-health. In modern times Cornil and Hanot have called attention to the presence of extensive cavities in the lungs in patients who present a better appearance than the average incipient case.

But this sort of coincidence is practically ignored by many authorities. Distinguished clinicians, like Peter and Grancher, state in the course of their lectures that in this or that patient, we may exclude the possibility of tuberculosis because of the degree of plumpness in evidence. Citations of this sort might be multiplied almost at will.

With regard to the explanation of this phenomenon of non-wasting consumption, the author quotes largely from the thesis of Denis (Lyons, 1894), which is a study of tuberculosis when due to germs of attenuated virulence. Denis prepared his thesis under the inspiration of Professor Arloing, who is well known for his researches in the bacteriology of phthisis. The phrase "pulmonary scrofula" is used to denote the local, slowly progressive affection which is able to gradually destroy the lung without at the same time inducing a general breakdown of the individual as a whole. However, Lemoine does not unqualifiedly subscribe to Denis' views in the explanation of these clinical cases, regarding them as too schematic, and too much bound up in laboratory experiments.

While the author admits that bacilli exhibit degrees in virulence, he thinks the question of soil a more important one; and while conceding that there may be some analogy between these fat consumptives and many cases of so-called scrofula, of glands, etc., in which the general condition remains good, he explains such analogy by quality of soil rather than by relative virulence of germs. He chooses to see a certain incompatibility between arthritism and tuberculosis; so that when an arthritic individual does become infected by Koch's bacillus, the latter makes slow headway, the mischief exerted is local, and the general health and forces are long maintained.

When an arthritic becomes tuberculous, his florid hue tends to obscure the natural pallor of phthisis. Similarly, the natural tendency of the arthritic to obesity antagonizes the other disposition to emaciation, and may even more than hold its own, as during the extremely slow evolution of the local pulmonary trouble the natural tendency of the patient to take on flesh is not interrupted. These patients cough a good deal, especially at night, but there is not much sputum. Night-sweats, when present, are limited to head and shoulders. The appetite and digestion are naturally fully conserved in these cases. When patients of this sort are placed upon anti-tubercular diet and remedies, they respond quickly, although we do not see corresponding local amelioration.

The author refers to a number of cases which he has attended in his practice, which observations form the basis of a recently issued thesis (Lille, 1899) by his pupil Martin (Les phthisiques gras).

But all of these fat consumptives are not arthritics. The expression "scrofula of the lungs" is something more than a mere simile. Lemoine believes that some of these non-wasting patients are literally scrofulous subjects. Going back to the time of Richard Morton, we find the statement by that author that when a scrofulous individual becomes phthisical, the latter disease runs a slow and afebrile course. Franck and Desmaroux express themselves similarly.

Marfan states that the scrofulous patient seldom becomes consumptive, and that when he does, the disease pursues a slow, benign and apyretic course. Farrand also speaks of the astonishing conservation of embonpoint in the scrofulous consumptive. Qumquaid speaks of this phenomenon at some length.

Plump consumptives are popularly supposed to suffer from nothing worse than bronchitis. They are frequently carried off by intercurrent attacks of pneumonia, pleurisy, influenza, etc., or in certain cases by fatal haemoptysis.

The slow and quasi-benign course of the disease does not augur a recovery, for almost invariably these patients, when not carried off by intercurrent disease, succumb to the natural extension of the pulmonary lesions, and ultimate participation of the organism at large, just as do ordinary consumptives.

PRESENT STATE OF OUR KNOWLEDGE OF TUBERCULOSIS.

Trupel read a paper with the above title at a recent meeting of the Verein Freiburger Aerzte (Muench. med. Wochenschrift, June 12, 1900).

He first refers to the several varieties of bacilli which closely resemble Koch's micro-organism; these include the bacillus of fowl-tuberculosis, the Petri-Rabinowitch, butter-bacillus, Moeler's bacillus of timothy-grass, and the same investigator's bacillus of coecum-tuberculosis.

More recently this list has been increased by the discovery of Rabinowitch's bacillus of pulmonary gangrene (previously confounded with the smegma-bacillus).

The true germ of tuberculosis has also been found to exhibit numerous phases or modifications. Some of them, such as lateral budding, dichotomous division, clubbing of ends, etc., have been known for a long time, as has also the ray-fungous form, but Schulze has recently gone so far as to claim that Koch's micro-organism is not a bacillus but a fungus. Lubarsch, who shares this view, looks upon the fungous chararcteristics as natural to the germ, and the ordinary bacillary structure as simply arrested development.

The tubercle bacillus also resembles the smegma-bacillus and the bacillus leprae to such a degree that at times only animal experiment can make a differential diagnosis.

It appears to be finally settled beyond doubt that the tubercle bacillus is never found free in nature, save for the brief period during which it maintains its vitality after being expelled from its host. Ubiquitous it certainly could not be, for it quickly succumbs to putrefaction, desiccation and the action of solar light.

It has been decided that the pig belongs in the same class as the bovine species in regard to liability to tuberculous infection. The goat, sheep, and especially game, are in a very different class in this respect, and this fact might be made use of in dieting those who are predisposed to infection. Fish cannot be made tuberculous by feeding them on infected sputum, although virulent bacilli are found in their intestines.

With regard to the inocuousness of fowl-tuberculosis, it must not be forgotten that parrots have communicated consumption to members of the human species.

While genuine tubercle bacilli are occasionally found in butter, we must not overlook the fact that the so-called butter-bacillus bears a very great resemblance to Koch's germ, from which it may at times be distinguished only by culture and inoculation.

Tubercle bacilli may undoubtedly exist in the more remote milk products, such as foods prepared from milk, and oleo-margarine.

With regard to general predisposition the great authority of Cornet may be invoked to dispute the existence of any preponderating role in this particular; with this investigator it is rather a matter of the dosage of the virus than of inherited predisposition. Similarly the present belief in regard to local (pulmonary) predisposition, is that more depends upon the natural activity of the ciliary epithelia of the respiratory tract than upon any other single factor, since it is the business of these cilia to protect the lungs from the invasion of particles, infectious or otherwise.

A vastly important discovery of quite recent origin is that the evidence of tuberculosis afforded by fever must be regarded as highly equivocal, because pure local tuberculosis is essentially afebrile. The author is inclined to lay the most stress in the early diagnosis of tubercle upon such symptoms as pallor, emaciation, weariness, slight unaccountable dyspnoea, dry cough. Henkel's trial-puncture at the apical region may be regarded as an addition to our knowledge, while the tuberculin test cannot be too highly praised. With regard to trustworthiness, B. Fraenkel got only 3 per cent. of error in 8000 cases.

The number of conditions which are known to cause haemoptysis appears to be constantly increasing, necessitating added foresight in making a diagnosis by exclusion.

Numerous other aspects of the present state of our knowledge of tuberculosis are enumerated by the author, but these have all been thoroughly discussed in the JOURNAL OF TUBERCULOSIS.

ALCOHOL AND PHTHISIS.

Jacquet (La Normandie Medicale, April 15, 1890) refers to the double organized warfare against these two agencies which is being conducted in some portions of France. He describes tuberculosis in a few pointed phrases, and then gives an account of the phenomena of alcoholism, and of the recent great increase in per capita consumption of brandy, absinth, etc. Certain trades and occupations—the fisheries in Normandy, for example—have almost been threatened with ruin on account of drunkenness. Agitation has produced some benefit, as shown by a lowering in per capita consumption of alcohol; but in the meantime the author finds that over 70 per cent. of cases of phthisis in this region were alcoholic subjects before tuberculosis set in. The public appear to be well aware of the connection between alcoholism and consumption.

In Paris the mortality from tuberculosis is on the increase, despite all improvements in sanitation. Are not many deaths which are recorded as caused by influenza and chronic bronchitis actually due to phthisis? For every 10,000 deaths from the latter we find recorded 11,000 deaths from chronic bronchitis! This does not stand to reason. At any rate, the mortality from tuberculosis ought to diminish for various reasons; but instead of keeping pace with improved sanitation it grows with the increasing per capita consumption of alcohol.

English statistics are here quoted showing the mortality from phthisis in various occupations: Barkeepers come first, commercial travelers next, artisans of all kinds third, while at the other extreme we have the clergy with the lowest death rate, agriculturalists next and physicians third.

In other words, those whose callings impose restraint and moderation (as in the case of clerymen and physicians), or who lead an existence which does not harmonize with the abuse of alcohol, as in the case of the small farmer, present a low mortality from phthisis.

Taking 185 per 100,000 as the average mortality from phthisis, London barkeepers show a figure of 607, while agriculturalists stand at but 79.

With 185 as the average mortality, Paris has 380, Havre nearly 600, Rouen about 500, etc. In Gottenborg, Sweden, where a system of restraint has been practiced for some years, the phthisical mortality is still 300 per 100,000.

It readily appears, therefore, that in France—at least in some of its cities and departments—the best way to attack the predisposition to phthisis would be the abolition of the trade in the highly-alcoholic beverages.

CAUSES AND LOCAL BEGINNINGS OF PULMONARY CONSUMPTION.

Aufrecht (Aerztliche Rundschau, April 21, 1900) publishes a brief communication in reference to the propagation of tuberculosis which is somewhat reactionary in tone. He states that the contagiousness of the disease is by no means proven. One of the arguments adduced in favor of direct transmission is the considerable mortality among nurses who wait on consumptives. There is, however, a source of fallacy present here. How do we know that these nurses were sound when they first took up their calling? Is it not a fact that privations, involving unfavorable hygienic relations, often compel women to take up this occupation? As a matter of fact, of 49 pupils who were about to learn the profession of nursing, no less than 29 were found to have right apical disease.

But the modern sanitarium movement is not in harmony with the theory that pulmonary consumption is infectious. Who would undertake to treat syphilis or glanders by fresh air and nutrition cures?

We cannot determine whether or not phthisis is an infectious disease due to the tubercle bacillus by a study of the latter parasite, which is able to produce miliary tuberculosis only, never isolated pulmonary phthisis. What we most need is a complete investigation of the beginning of the disease in the apex of the lung.

This beginning, as accidentally found in the lungs of persons dead from non-tuberculous disease, is practically a true infarct; and at times we are even able to demonstrate the thrombosed vessel which is at the bottom of this primary focus. The cause of the thrombosis is, in turn, a thickening of the wall of the vessel, which is present often to a marked degree. This early participation of a blood vessel explains the frequent occurrence of the initial haemoptysis which in no wise differs from any other haemorrhage of embolic origin. These infarcts readily become transformed into cavities with thickened fibrous walls.

In the immediate vicinity of these infarcts we find small miliary and larger acinous foci with intervening healthy lung tissue. The miliary foci, however, are not miliary tubercles, but minute thrombotic foci in which the finest arterioles are plugged after undergoing thickening of their walls. These foci consist of a central haemorrhagico-neurotic zone and a peripheral layer of proliferated connective tissue which further contains numerous thickened blood vessels. The giant cells in these foci may proceed from coalesced alveolar epithelia.

This process may be reproduced indefinitely without implication of the bronchi until a softened thrombotic focus breaks through a bronchial wall. Thus we can understand how a lung may be infiltrated to such an extent as to give percussion dullness, while at the same time cough is wholly absent, and haemoptysis the first rational symptom.

Up to this point the tubercle bacillus has not appeared upon the scene. Aufrecht does not believe that this bacterium can settle in healthy lung tissue. If it gain access through the bronchus to a softened thrombotic area, or to alveoli which are the seat of a secondary desquamative pneumonia, it finds suitable culture-medium. However, it plays a minor role in the development of the disease save when it gains access to the circulation; then we have the generalized miliary tuberculosis.

What now is the nature of the primary thickening of the vascular wall which appears to be at the bottom of the entire pulmonary disease? It is a simple inflammatory process, an arteritis of the finer twigs due to the irritation of carbonic acid and other noxious products of combustion, sent by the right ventricle through the pulmonary circulation.

The predisposition is furnished by whatever disturbs or renders difficult the circulation—such as a sedentary life; and, from an entirely different standpoint, an unusually active life involving forced expiration, or participation of the auxiliary muscles of respiration—these unusual efforts (excessive athletics, mountain climbing, etc.) cause stretching of the lung tissues, since the sterno-mastoid and trapezeus muscles extend the lung tissue in a direction opposite to that which results from the action of the elevators of the ribs and the diaphragm.

The predisposition of the right apex is probably due to the greater amount of work performed by the right arm, involving an additional degree of stretching of the apical lung tissue.

ON THE SIGN OF PAIN AND THE THORACIC REFLEXES IN THE PERIOD OF DEBUT OF PULMONARY TUBERCULOSIS.

Roussel of St. Etiene (La Loire Medicale, March 15, 1900) refers to the study by Carcassonne (Arch. gen. de med., February, 1900) on the atrophy of the thoracico-scapular muscles, as seen in consumptives, particularly in connection with the early stages. The author then describes his method of ungueal percussion, in which the percussing finger strikes only the nail of the percussed finger. In an illustrative case in which a patient presented no evidence of phthisis except emaciation and a slight dry cough, physical signs negative, percussion by the ungueal method isolated a sensitive point beneath one clavicle. Following up this lead, it was possible to map out a sensitive area. A vertical line extending from the centre of the clavicle to the third or fourth rib, and a space of three or four centimeters on each side of the vertical line, give us the dimensions of the dolorous region. A similar sensitiveness, less marked, was evident in the supra-spinous fossa behind. Much more rarely we find tenderness in the sub-spinous fossa. This sensation evoked by percussion is perhaps better termed a hyperesthesia—not of the skin, however, but seated in the muscles themselves. The skin may be pinched up or otherwise roughly handled without any unusual sensations. In a healthy individual ungueal percussion cannot induce this hyperaesthesia.

This form of percussion evokes not only muscular sensitiveness, but muscular reflexes as well. This phenomenon occurs not only in a restricted area of tissues with the production of a node, but the entire pectoralis major may contract at once. In the limited contraction the act is probably idio-muscular; but when the whole pectoralis contracts, moving the arm inward, the reflexes must be neuro-muscular. With the atrophy which these muscles undergo in phthisis, the reflexes tend to diminish. These muscular phenomena may be evoked in any spare, vigorous young man. In phthisis, however, the hyperaesthesia stands in a direct relation with the reflex, because the latter represents a muscular "defense."

Roussel now discusses another series of reflexes, not caused by percussion. To demonstrate these phenomena, have the patient sit erect and without inclining to one side or the other. The thorax and the upper part of the abdomen should be exposed. The physician faces the patient directly, and tells him or her to breathe deeply and slowly. One is often struck by the marked asymmetry with which the chest fills. We may see the ribs and even the clavicle in a state of inertia, while the trapezius and sterno-mastoid appear to be in a condition of paresis. The inspiratory supra-clavicular depression held by Revillet to be characteristic of tuberculous pleurisy of the apex, may often be noted. Grasp the base of the thorax on both sides, thumbs in front and fingers behind; it will be noted that the diaphragm rises higher on one side than on the other. The Roentgen rays corroborate this unequal elevation of the diaphragm in early phthisis. The behavior of these various muscles, this paretic condition, is attributed by Roussel to an inhibitory reflex (not to muscular atrophy).

Similarly the atrophy of muscles which sets in with the onset of phthisis is held by Roussel to be a trophic reflex.

The act of percussion very often causes a small congested circle to appear in the skin. This phenomenon, which quickly disappears, is termed by Roussel the vaso-motor reflex.

Electrical tests by the author show that the faradic reaction of the muscles is diminished in incipient phthisis.

With regard to the rationale of the pains and reflexes, Roussel is inclined to believe that they originate solely from the coincident pleurisy. Chourizuine (These de St. Petersburg, 1895) induced acute experimental pleurisy and found that myositis was actually developed at the same time. Others have believed that either myositis or neuritis was at the bottom of the phenomena described in the present article. Still others see in the thoracic amy-trophy only a consequence of muscular disease. Gauthier regards the muscular lesions as due to toxines manufactured in connection, with the pleurisy, but Carcassonne refutes his arguments.

Roussel believes with Vulpian (Theses of Valtae, Paris, 1877) that these muscular phenomena are wholly reflex in nature, and exactly similar to the atrophy of the muscles about an inflamed joint. This synovial membrane of the knee and the pleura are anatomically and physiologically similar, and the conclusion appears to be perfectly just.

ATROPHY OF THE SCAPULA-THORACIC MUSCLES IN INCIPIENT PHTHISIS.

Dr. Paul Carcassonne gives an exhaustive review in the Arch. gen. de med., February 1, 1900, of the literature of this interesting subject. Between twenty and thirty papers have been published thus far upon the relations between tuberculosis and pleurisy on the one hand, and amyotrophy of the racico-scapular muscles on the other. He arranges our knowledge of this subject under the following heads:

1. There is always a definite relation between the pulmonary lesion and the degree of muscular atrophy.

2. This muscular atrophy may set in at an early date and have a very great diagnostic value in respect to incipient tuberculosis.

The various arguments are discussed in which the muscular atrophy is ascribed respectively to disuse, neuritis, toxins, etc., etc., and the conclusions of the reviewer are as follows:

"We see in pulmonary consumption a form of muscular atrophy localized in the muscles near the intrathoracic lesion.

"This muscular alteration is revealed by deformities, functional troubles, alterations in mechanical and electrical excitabilty, muscular hyperaesthesia, etc.

"This atrophy coincides in point of time with the evolution of the subjacent lesions, and in regard to degree with the amount of mischief in the pulmonary tissues.

"This muscular phenomena may appear at a sufficiently early date to have valuable diagnostic significance, and to lead us to suspect pulmonary phthisis.

"The pathogeny of this affection is the same as that of the muscular atrophy seen in connection with arthritis. The alteration in the nervous filaments of the pleura exerts some sort of an influence through the spinal cord which has been variously interpreted as a simple reflex, a retrograde degeneration and a REACTION A DISTANCE. In a certain number of cases, alterations have been recognized in the cord."

TREATMENT OF TUBERCULOUS PERITONITIS.

A recently published Paris thesis (Laroche, 1900) sums up this important subject to date. There are a number of methods of treating this condition, but this multiplicity is due not so much to difference of opinion as to the fact that certain indications predominate in different clinical types.

In the acute miliary or destructive caseating forms, immediate laparotomy is always an absolute indication. The same intervention should obtain in the chronic fibrous form, provided that hygienic and medical resources have failed to benefit, always with the added proviso that extreme cachexia, pleural exudates, or stercoral fistulae are absent. It must be remembered that some of these peritoneal cases bear chloroform very poorly.

When we have opened the peritoneal cavity, our subsequent course must be varied according to circumstances. One step, however, must invariably be taken, viz., separation of adhesions between intestinal coils. It is easier to decide when not to flush than it is to give precise indications for lavage.

If there be ascites present, flushing can be of no service; while if the peritonitis be perfectly dry in character, there is nothing to be washed out. Pus and cheesy matter ought, in theory at least, to be subjected to lavage, but there is some danger of further infection of the peritoneum. Various antiseptic douches have been employed for this purpose, especially camphorated naphthol, while sterilized air has been used for the same indications. If the adhesions are of such character that encysted pouches have formed, and if such adhesions cannot be ruptured without great danger of wounding the intestines, we should endeavor to thoroughly cleanse and distinfect such artificial cavities. Drainage through the abdominal wound is thought to be indicated if detachment of adhesions has set up a tendency to parenchymatous haemorrhage. With regard to the extirpation of caseous foci, we should remove all cheesy matter that will come away, and then flush the peritoneum with some bactericide, bearing in mind that this act is but a makeshift.

RECOVERY IN A CASE OF TUBERCULOUS CEREBROSPINAL MENINGITIS.

Henkel (Muench. med. Wochen., June 5, 1900) describes the case of a ten-year-old boy who was treated at the Hamburg General Hospital, service of Dr. Rumpel.

The child had always been in good health until the present attack. No apparent point of entry for the tubercle bacillus. Abundant evidence of intracranial tuberculosis—bilateral optic neuritis, temperature 40.6 C. (105° F.), pulse 159, respiration 30; lumbar puncture revealed presence in abundance of tubercle bacilli in the cerebrospinal fluid.

On the third day after admission pneumonia of left lower lobe set in. Upon the eighth day a turn for the worse—cyanosis, paresis of left external rectus, anisocoria, absence of patellar reflex. No thermic crisis until about the eleventh day after admission, when the temperature, previously to 40°C. (104°F.) fell to normal. After this event the patient remained in a state of apathy. Ptosis, present in both eyes for a considerable interval, now disappeared together with the paresis of the left external rectus. Anisocoria, on the other hand, was persistent. No color-blindness.

About a month after admission the patient tried to walk, but his gait showed considerable incoordination; insomuch that the diagnosis was provisionally so changed as to include solitary tuberculous tumor of the cerebellum. However, the natural gait was slowly regained. For a month later there were evidences of slight bilateral apex-catarrh. As a very unusual sequel may be noted extensive falling out of the hair.

With regard to treatment employed, lumbar puncture, practiced several times for diagnostic purposes, appeared to give the patient some relief from pain. Calomel was administered inwardly. Baths were given daily when the spinal column was not too sensitive. For the apex-catarrh the only treatment was fresh air and forced feeding.

As far as the author is aware, only one other case is upon record (Freyhan, Deutsch. med. Woch. No. 33, 1894) in which a cure of tubercular meningitis was recorded, the diagnosis including bacteriological findings. Numerous cases have recovered where diagnosis was made by ordinary clinical means, sometimes confirmed by autopsy after death from other causes.

This case teaches us that we should not lose all hope even when our patients develop optic neuritis and paresis of the ocular muscles.

The author appears to believe that his case was rather an instance of spontaneous recovery than an example of the curative action of remedies.

TRANSMISSION AND PREVENTION OF TUBERCULOSIS.

From Dr. Hillier's recently issued work entitled "Tuberculosis" (Cassell & Co., 1900)—which is said to be the first treatise in the English language to consider the disease in all its aspects—we abstract a few details in regard to methods of transmission, prophylaxis, etc.

Proximity to the consumptive would entail no more danger of infection upon healthy individuals than would proximity to a case of typhoid, were it not for the infectious dust of the dried sputum, the virulence of which is compared by Straus to that of the discharge from a glandered horse. Thaon contracted a rapidly fatal tuberculous broncho-pneumonia while making animal experiments with tuberculous dust, and whoever repeats experiments of this sort does so at great peril to himself.

Mouth-breathing is believed to greatly favor the inhalation of bacilli into the lungs because the nasal chamber offers a natural barrier. Hence the child with adenoids and enlarged tonsils has the danger of infection greatly increased.

The cilia in the respiratory passages are believed to oppose the introduction of the bacilli into the lung tissue proper by means of a centrifugal current. When a child contracts measles, a desquamation of the ciliated epithelium results; and it is this fact rather than a lowering of vitality which causes measles to pave the way for tuberculous infection.

Next in importance to tuberculous dust in transmitting the disease comes tuberculous food-products. Mutton appears to be the one most particularly free from the possibility of infection, although poultry is not regarded as inimical to man, being subject to a form of tuberculosis not known to attack the human species. The virulence of tuberculous milk and its role in causing mesenteric disease in children is sufficiently well known, and whosoever is skeptical in this matter should read the classic cases reported by Lydtin and Nocard in which healthy and robust children, without any other known tuberculous environment, were stricken with abdominal tuberculosis after drinking milk fresh from cows afterwards found to have been infected at the time. Bovine tuberculosis and tabes mesenterica are alike practically unknown in the island of Jersey.

Under the head of prevention Hillier condemns the use of the railway rug, which is the means of bringing infected dust from the often filthy railway compartment to the home of the traveler. The problem of household dust, of how to expel it or render it harmless, is one worthy of earnest attention. Moisture and the principle upon which the carpet-sweeper is constructed should be employed as far as possible in dusting.

There is still a vast amount of inertia present in regard to boiling milk. Many educated people, and even medical people themselves, do not live up to their principles in this respect. Hospitals, one of the duties of which should be to instruct the laity, refuse in many cases to sterilize the milk because a little trouble is thereby necessitated.

Hillier pronounces forcibly the great error of permitting children to go bare-legged. Even the philosopher Herbert Spencer does not regard this subject as trivial, for he has also raised his voice against it. Such children appear to be more subject to catarrhal affections, adenoids, etc., than those who are properly clad and this custom may play no inconsiderable part in leading up to tuberculosis.

France appears to have taken the lead in compulsory use of spittoons, which enactment is now enforced in many schools. Sputum is bound to be placed in time in the same rank with urine and feces, neither of which excreta is deposited in other than special receptacles.

The modern sanatorium will take its place as a great educator, in addition to its other services; for the comparatively ignorant comsumptive, after a sojourn at one of these institutions, may be counted upon to instruct his neighbors and friends upon the necessity of fresh air, cleanliness, etc., etc.

No laws in regard to the prevention of consumption can be regarded as actually in force unless individuals are compensated for the destruction of property. This applies especially to the condemnation of tuberculous milch cattle. It is doubtless wiser to isolate rather than destroy the animals, for obvious reasons. In South Australia, the milk of reacting cows is compulsorily boiled for ten minutes, which appears to be a just and sensible solution of the entire problem.

PROPHYLAXIS OF TUBERCULOSIS.

Kroenig (Deutsche Aertzte-Zeitung, March 1, 1900) states as an axiom that the greater the natural defence of the body the more certain the guarantee against tuberculous infection.

By natural defence is implied the presence of a good circulatory apparatus, normal volume of blood and blood-count, well-built thorax and good development of respiratory muscles, freely movable lungs, sound mucous membranes (nose, larynx, bronchi), a well-kept and well-hardened skin, etc., etc. It is hardly conceivable that a person with these requirements could contract pulmonary consumption. The more these essentials are deficient the greater the liability to infection.

Nevertheless, in prophylaxis, it is most logical to attack the exciting cause or bacillus first. Kroenig believes that the very first requirement is to prevent the bacillus from gaining admission into the household. He shares the common opinion that the long skirts of women which drag upon the pavements are responsible for the importation of many virulent germs into the dwellings of the people. Many more must adhere to the soles of the shoes, and in the houses of the better classes the doormats perform a good service. The bacillus, whether tracked in or carried by long skirts and cloaks, eventually contaminates carpets and rugs. The little child who plays upon the floor is particularly exposed to the danger of infecting itself through some abrasion of the skin or mucous surfaces.

The smaller and more crowded the dormitory the greater the danger of infection. If a woman's skirt has become contaminated with the filth of the sidewalk she should at once immerse the soiled portion in 2 per cent. carbolic acid, instead of allowing the garment to dry with a view of brushing off the desiccated sputum. Shortening of women's skirts to the extent of a few inches necessarily does away with this entire problem.

Napkins are undoubtedly a source of danger in several ways. In some hotels these articles when not visibly soiled are not thoroughly laundried, but are merely sprinkled and ironed.

It is quite possible that bacilli pass directly from mouth to mouth through these napkins, which should be made of paper and destroyed after use.

PROPHYLAXIS OF TUBERCULOSIS.

Brouardel (Ann. d'hyg. pub., etc., May, 1900) begins a consideration of the subject of the prophylaxis of tuberculosis by drawing a comparison in which Asiatic cholera figures. Fauvel was on two occasions the means of saving thousands of Europeans from death by the latter scourge at a time when prophylactic resources were greatly inferior to those of our own day. During the years in which the cholera succeeded in ravaging Europe, the mortality on each occasion ran in round numbers from 100,000 to 150,000. Fauvel may then have prevented a mortality of 250,000, roughly speaking. These figures appear large; yet in France alone, 150,000 individuals die annually of tuberculosis! This state of affairs is perennial, for Hypocrates speaks of the malady as the one which destroys the most of mankind. The Father of Medicine also recognized the curability of phthisis in its early stages, but in time this fact was lost sight of and remained buried until in our own day it has again asserted itself, its revival being based on anatomico-pathological evidence.

Brouardel himself can bear personal witness that the Paris morgue is a document not only to the curability of phthisis, but to the deadly influence which Paris exerts upon its citizens. The majority of autopsies made at the morgue upon those who have resided in Paris for a dozen years, show foci of healed tuberculosis.

In speaking of some of the contributory causes of phthisis, Brouardel says of alcoholism that it has two grand tendencies, viz.: mental alienation and pulmonary consumption. What may be termed alcoholic tuberculosis is less curable than are other forms.

The author cites a typical case in France, in which an artisan, father of a considerable family who are forced to live in limited quarters, becomes first an alcoholic, and finally, after taking cold, develops phthisis. He continues to work as long as his strength holds out, and when his earning power fails the family is plunged into the deepest poverty. The father and then the worn-out mother are borne to the hospital, while the children become charges of the State, and in short order succumb to various affections in which tuberculosis plays the principal role. In a few years the family is completely extinct. This is not all the mischief done, for in the meantime relatives and neighbors have become infected from the members of the now extinct family.

Incidentally the author condemns the servants' quarters in the households of the wealthy, as active factors in the nurture of consumption. These quarters are, as a rule, small stuffy rooms on the highest floor. In the summer overheated by the rays of the sun which beat upon the zinc roof, and in the winter correspondingly cold, these dormitories are virtually uninhabitable. The servants are usually young country girls, accustomed to open-air life. As a result of spending their nights in these unwholesome quarters they soon become anaemic, and in a year frequently fall a prey to phthisis.

The factories in which are employed many tuberculous workmen are notably unsanitary structures, eminently suitable for the propagation of tuberculosis.

With regard to the schools, there is reason to believe that one child in five is tuberculous and a menace to the health of the others.

Concerning the actual transmission of the disease, Brouardel describes the case of a notary's clerk who was tuberculous. He had two bad habits—one of wetting his fingers as he handled documents, another of spitting in a spittoon filled with dry sand and placed very near the register. The current of hot air assisted in volatilizing the dried sputum. Within a single year no less than six cases of acute phthisis developed within this household.

After extensive tables of the morbidity and mortality from tuberculosis, Brouardel says that France is surely becoming depopulated, and he hails the modern sanitarium movement and leagues organized for the purpose of combatting the disease by all promising methods as the only hope for the salvation of his country. No patriotic Frenchman can do otherwise than co-operate in this warfare for the conservation of his fatherland.

RESULTS OF SURGICAL TREATMENT OF CEREBRAL TUBERCULOSIS.

Treyer (Rev. med. de la Suisse Romande, May 20, 1900) first enumerates the various forms of endocranial tubercle, viz.: acute diffuse meningitis, subacute or chronic (focal) meningitis, and solitary tubercle. The present study is limited to a consideration of the latter type.

The cerebral tuberculous tumor is an affection of frequent occurrence in childhood and youth, but relatively rare in the adult. There is abundant evidence that at least one-third of all endocranial tumors are tuberculous in nature. A most striking fact, however, is the relative infrequency of surgical intervention in tuberculous tumors. As far as operative statistics go, only one tumor out of thirteen is of tuberculous nature. The discrepancy between this ratio and that afforded by the records of autopsies appear to show that there is either some obstacle to diagnosis, or that the indications for intervention in these cases are unfavorable, perhaps because of difficulty in localization. It is apparent that tumors of the base of the brain, lateral ventricles, corpora quadrigemina, cerebral peduncles, pons varolii, medulla, etc., etc., are inoperable; therefore it would at first sight appear that endocranial tuberculous tumors affect inoperable localities. This conclusion is borne out by Starr's statistics. Out of 193 cases of these tumors only some 30 were in operable localities, which latter consist only of the cerebral cortex and centrum ovale. Since tumors outside of the motor area are difficult to localize, this small number (30) may be still further reduced one-half, owing to the site of the lesions. Further there is not only a considerable tendency of these tumors to be multiple within the cranial cavity, but there is also an almost universal tendency to association with tuberculous foci outside of the brain. All these factors tend to greatly reduce the chances of operative success.

Treyer now reports two unpublished cases in which complete recovery and improvement were respectively obtained.

Girl aged 7½ years. Jacksonian epilepsy, limited at first to face and arm. Scrofulous keratitis and torpid iritis. Bilateral apex-catarrh with slight haemoptysis. Condition febrile at times, temperature even mounting to 40.3° C (104.5° F.). The Jacksonian spasms eventually involved the lower extremity. Cervical adenopathy, with congestion and oedema of face. As a result of the epileptic paroxysms, considerable paresis and inco-ordination developed. Professor de Cereuville made a diagnosis, not of tuberculous tumor, but of chronic focal tuberculous meningitis, involving the left motor area, corresponding to the centre for the arm and face.

Operation by Prof. Roux. Trephine opening made over the left Rolandic region. A tumor was found, perfectly circumscribed, deeply penetrating, but readily enucleable with the finger. When extirpated the mass was of the size of a mandarin orange. Microscopical examination confirmed the diagnosis. The middle meningeal artery was ligated, the opening drained and dura mater sutured. The wound healed by first intention. The right foot assumed the equinous position from spastic paralysis, while the arm rapidly regained its functions.

Two years later it was ascertained that there had been but a single attack of epilepsy since the intervention (about six months afterward). The right eye was found to be normal, save for the old iritic adhesions and slight paresis of the external rectus. The mouth and tongue were drawn slightly to the left, the right upper limb showed a tendency to flexion of most of the muscles, while the right leg was still in equinous position, the patient walking with a slight limp.

The second case, which occurred in an adult, was strikingly like the first.

It is worthy to note that in neither case was there either headache or vomiting. The second patient had no choked disk, contrary to the general rule. In both cases an apparently temporary paresis of the arm became in time a permanent palsy. In the first case, the pulmonary lesions appeared to undergo spontaneous resolution in a most remarkable manner.

SURGICAL TREATMENT OF RENAL TUBERCULOSIS.

Koenig (Duetsch. med. Wochenschrift, February 15, 1900) stated that tuberculosis of the kidney is an affection of equal interest to physician and surgeon. His address, published as above, was delivered by the distinguished surgeon before a body of physicians (Verein fuer innere Medicin, January 29, 1900) by special invitation; and there were exhibited sixteen specimens of infected kidneys removed by the essayist, who also presented a number of patients who had successfully undergone nephrectomy.

At no very remote period renal tuberculosis was almost unknown. The bladder then presented practically the sole recognized localization in the urinary passages. Finally it came to be understood that much of the so-called bladder tuberculosis was in reality located in the kidney. After Gustave Simoni had shown that a man could exist with one kidney, nephrectomy was regarded as a possible surgical resource, and after these organs had been extirpated for calculosis and cancerous affections, with occasional unpremeditated removal of tuberculous kidneys, these latter structures became the object of deliberate surgical interference.

An important sub-division of the subject matter is as follows: First, foci of disease which do not involve the kidney-pelvis; and, second, tuberculous pyelonephritis. The second form may be a result of the first so-called descending type, or it may have come about through ascent of the infection, which may further extend into the substance of the kidney. But in any case it is important to differentiate between pure renal tuberculosis and pyelitis or pyelonephritis; the first affection can hardly be diagnosticated during life, and is chiefly recognized by chance in the course of autopsies. At the moment, however, of the irruption of a renal focus into the pelvis of the kidney, the nature of the process may be surmised. Koenig relates an interesting case in which a gonorrhoeal infection precipitated this extension of disease. Fever set in suddenly with haematuria and the entire picture of tuberculous pyelitis developed, including the presence of bacilli in the urine. In another case, Koenig believes that the irritation caused by inhaling turpentine fumes occasioned the same increase of local mischief with symptoms akin to those of the first mentioned case.

With regard to pure renal tuberculosis, diagnosis must be made, if at all, by the internal clinician; but if pyelitis is present, recognition of the nature of the disease is remarkably easy. The symptoms in the latter case are those of bladder catarrh, but with differences. Typical kidney pains, sometimes moderate, sometimes like those of renal colic, often co-exist. The microscope shows the presence of epithelia from the kidney pelvis, and connective tissue fibres; while blood corpuscles are especially numerous; aside from the profuse occasional haemorrhahges which are prone to occur. Bacilli are often absent, while the occasional accidental presence in the urine of the smegma bacillus has led to more than one mistaken diagnosis. Numerous other symptoms have a minor significance, hectic, a pallor which indicates a cachexia, the frequent co-existence of nephroptosis in women, etc., etc.

With regard to treatment, Koenig first discusses Max Wollf's plan of resection of the kidney. He regards this as chimerical, and need only look at the sixteen specimens exhibited to see the impracticability of such a method for the average case. There is another "conservative" operation, the cystotomy of Guyon and others. Koenig has had only fatalities under the use of this method. There is then, for him, nothing left but the radical extirpation after making sure of the presence and healthy condition of the opposite kidney. Absence of one testicle is a sign of great value in the diagnosis of single kidney. Cystoscopy is much employed to establish evidence of two ureteral orifices. To further determine the condition of the kidney to be left, the cystoscope is again in demand. If clear urine emerge from the ureter of that side, the evidence of health of the kidney is almost conclusive. Catheterization of the ureter may be both untrustworthy and dangerous.

Koenig states that in a certain per cent. of cases we cannot determine the condition of the kidney to be left, just as we are not always able to diagnosticate a tuberculous kidney. On one occasion, by mistake, the essayist removed the organ for simple pyelitis, no element of tuberculosis being present.

Coming now to the question of nephrectomy when the opposite kidney is affected, Koenig states with positiveness that a man may survive, even with comfort, when the remaining half of his renal apparatus is still further impaired by disease. We know from the teaching of Simon and Tuffier that a man has three times as much renal tissue as he actually requires. The views of the essayist upon this point have become far more radical than was once the case.

Koenig's entire operation material consists of eighteen cases, two-thirds of which occurred in women. The total mortality was six cases, the operative mortality comprising one-half, while the others died of various tuberculous affections; the remaining twelve patients have survived both the surgical interference and the disease itself, although the interval in one of the twelve is really too brief to exclude secondary mortality.

The first successful case, which has survived the nephrectomy for twelve years, was an example of tuberculosis of the bones, testicle and kidney. Another patient, who has also been well and strong for six years, had foci of the disease in the prostate, testicle and kidney. Cases of the preceding type are relatively simple in nature, despite their apparent gravity. As examples of a more complicated sort in which the bladder and even the opposite kidney were slightly affected, Koenig cites the following: A patient had haematuria with evidences of renal tumor. Extirpation of the affected kidney showed that the blood could not have proceeded from it, because its pelvis was filed wlth caseous material. Besides, haematuria reappeared after the nephrectomy. Tuberculosis of the bladder was known to be present and the other kidney was evidently involved, in Koenig's opinion, yet the patient recovered her health in a most surprising manner, and lived seven years, dying in childbirth. Cases of this sort make the prognosis in urogenital tuberculosis somewhat more hopeful than is generally believed. Koenig cites other examples which show that it is justifiable to extirpate a tuberculous kidney when the bladder is also affected, and when the opposite kidney is slightly compromised, the indication being the same here as in simple participation of the tesiticle and prostate.

PRELIMINARY EXAMINATION OF SANITARIUM PATIENTS.

Brandenberg (Berlin klin. Wochenschrift, 1900, No. 16) delivered a lecture at the Charite, Berlin, on March 15th last, upon the subject of his experience in the preliminary examination of candidates for the Grabowsee Sanitarium. The design in institutions of which the latter is a type is to admit only such cases of phthisis as are incipient. By adhering to this rule, Turban claims for his Davos sanitarium that 97 per cent. of patients might be permanently cured, this being the actual percentage of recoveries for that class of cases. For those in the second stage, but 17 per cent. recovered permanently. Incipient cases are easy to treat, as they are in condition to receive the full benefit of out-door air. Advanced cases often respond poorly to methods of treatment. The admission of a patient in the later stages of phthisis into a sanitarium crowded with largely incipient cases may lead to numerous unfortunate happenings. A first-stage patient may be required to give up his bed to the man with the advanced case, and while the former is waiting outside for a chance to return, his disease may make fatal strides. The newcomer perhaps requires special care and attention, which it is difficult to furnish. Finally there is danger of the advanced case spreading the strepto-coccus infection, which doubtless complicates his tuberculosis, among his fellow patients.

In Gerhardt's clinic in Berlin, many candidates for sanitarium treatment are encountered; some being sent by practitioners, while others come of their own accord. As the author of the paper is Professor Gerhardt's chief of clinic, it has devolved upon him to recommend certain cases as specially adapted to sanitarium treatment, and the object of his paper is to suggest the course which he has found to be most expedient in diagnosticating cases of tubercle at a very early stage.

The time has passed in which it was customary to seek for bacilli in the sputum as evidence of beginning phthisis.

It is safe to say that not over one-half the patients who have gone to Grabowsee had bacilli-bearing sputum when they entered.

A series of symptoms is usually present in these cases—emaciation, weariness, gastric disturbances, restlessness at night, are the phenomena for which we look among the hard-working artisans who visit the clinic with suspicion of being incipiently tuberculous. The percentage of those with gastric disturbances is notably high, anorexia and repugnance to food being very common symptoms. The differentiation of these cases from simple disorders of the stomach demands great care. In some cases a trial breakfast will decide the matter with certainty.

A condition of anaemia and defective nutrition is another source of confusion, owing to the difficulty in differentiating tuberculous anaemia from other similar blood states. Cases of plumbism are encountered among certain artisans, and it is necessary to look for the blue line on the gums in order to exclude the likelihood of this form of metallic poisoning. There are anaemias of occupation—for example, in tailors. Striking pallor of gums and larynx suggest early phthisis. Rapid pulse is another well-known symptom. About one-half of those who are admitted to Grabowsee Sanitarium have night-sweats.

Early haemoptysis is extremely common in the artisan class—from a third to a half of all cases. Not much is said by Brandenberg as to cough, and it does not appear to be a marked or universally present feature in these cases. On the other hand, shortness of breath is common, and pains about the chest and shoulders are of extremely frequent occurrence; they are referred alike to the muscles or joints. The habitus phthisicus is often missed.

Before recommending cases to Grabowsee, a searching physical examination is always made. If but half a lobe is involved in the process, the case is regarded as being one of the first stage, and eligible. If a case has passed into the second stage, but is still limited to one side of the chest, the patient is also eligible. Bilateral implication, however slight, rejects from Grabowsee.

Patients in the first stage may require rejection because of complications. Some of the latter are extensive laryngeal disease, obstinate chronic diarrhoea, nephritis, etc., etc.

A patient with cured phthisis was used as a demonstration. He had been admitted to Grabowsee on numerous occasions, and was now back at his trade. The observation period had been about four years. Although typical habitus phthisicus had been present at the outset, the shape of the chest had become much altered, from emphysema.

The author appears to believe that our energies should be concentrated principally on the recognition and cure of the first stage.

NEW MODE OF TREATING TUBERCULOSIS BY ORGANOTOXIN.

Gouel, in a short article in La Franc. Medicale, March 10, 1900, prefaces an account of this new method by a few remarks on sero-therapy and other recently tried remedies for phthisis. The serums, he thinks, have spoken their last word, while the use of electricity, ozone and X-rays may hold out some slight hope of benefit for the future. Attenuation of toxins a la Koch is a resource which has fallen greatly below expectation, but has opened a way for further research. Thus Lannoise, after much study, has succeeded in preparing a so-called "organotoxin" which is unlike any other such product of pathogenic bacteria in that it is apyretic and even causes a fall of temperature.

The organotoxin is prepared as follows: Bouillon is made of lean beef, with addition of 10 per cent. glycerine and 6 per cent. dry peptone. It is then sterilized on the autoclave at 115° and kept at 37*C. for 48 hours.

After this the clear bouillon is decanted off and sowed with pure cultures of human tuberculosis. It is then taken back to the oven for from 30 to 120 days, then exposed on the autoclave at 120° and filtered in Chamberland's filter. For safety these two latter steps are repeated.

The resulting product is called the mother-toxin. By gradually attenuating, organotoxins A, B, C, D and E are formed, A denoting the weakest. The weaker toxins are first employed, and then guided by the tolerance, the stronger products are substituted at intervals of three or four days.

Lannoise first tested his remedy upon himself. If A and B caused no reaction he proceeded to use C, D and E, these liquids being usually injected into the buttock. Generally speaking, these products, when cautiously employed, were not followed by any appreciable train of phenomena.

When injected into phthisical subjects, however, the stronger toxins caused a local reaction in the focus of disease with a surprising amelioration and tendency towards resolution. At the same time the sputum cleared up and disappeared. Lannoise believes that his organotoxin has an energetic action in regard to secondary infections. Instead of a rise of temperature there was invariably a fall. A remarkably favorable action was exerted upon the gastro-intestinal tract. Weight is taken on, sometimes as much as eighteen pounds in four months. In amenorrhoea, the menses were re-established. The night-sweats were improved, somewhat slowly.

Lannoise has tested his organotoxin in nearly a hundred cases, and believes that the harmlessness of the preparation and its antipyretic quality form a strong argument for its employment by the profession.

LIGNOSULPHITE IN TUBERCULOSIS.

Simon (Aerztliche Rundschau, Jan. 13, 1900) speaks of the therapeutic nihilism which has grown up about tuberculosis, but adds that he no longer sends his patients south since he began the use of lignosulphite, and concludes that this remedy must represent an advance in our therapy of phthisis.

He describes the origin of this substance in commerce, and the accidental discovery that workmen who inhaled the irritating vapors caused by the treatment of wood with acid calcium sulphate (in the manufacture of cellulose) appeared to enjoy a certain immunity towards phthisis. including recovery on the part of those already attacked. Similar therapeutical results were noticed in connection with the vapors of sulphur dioxide inhaled in connection with the manufacture of ultramarine.

The author now quotes further evidence in favor of the beneficial action of sulphur dioxide in phthisical affections. He is of the opinion that this gas, unlike inhalations of medicaments in which steam is the vehicle, is able to penetrate as far as the pulmonary alveoli, while the steam-borne substances are precipitated long before they reach this territory.

Lignosulphite has had some reputation as an expectorant, but not as an anti-tubercular remedy. Schmidt, in the Penzoldt-Stintzing handbook, appears to teach that an expectorant can by its special action favorably influence such symptoms as night-sweats, fever, anorexia, etc. The present author contends that this is not true of our ordinary expectorants; nor does he believe that the materies morbi of a pulmonary disease can be coughed out of the body.

Simon claims that he has seen apical catarrh clear up after eight or ten inhalations of lignosulphite. He has also seen the ulcers of laryngeal phthisis heal up after a series of inhalations. The alterations in the sputum and physical signs of advanced pulmonary phthisis under the influence of inhalations of lignosulphite are delineated at length, and the author appears to believe that the penetrative powers of lignosulphite are equal to the cure of phthisis in the cavernous stage. The ulcer of the lung parenchyma heals no less readily than the ulcer of the larynx. In hopeless cases lignosulphite contributes powerfully to euthanasia.

Simon says in conclusion that lignosulphite is not only a bactericide, but sterilizes the soil of the lung tissue, so that these vegetable organisms would in any case quickly perish for lack of pabulum.

EDITORIAL.

MUNICIPAL REGULATIONS FOR THE PREVENTION OF THE SPREAD OF TUBERCULOSIS.

While we are clamoring for state prophylactic measures, and for state institutions for the treatment of the consumptive poor, we are apt to overlook what can be done by local boards of health for the prevention of the spread of tuberculosis. With proper ordinances and the enforcement of regulations, much may be accomplished by the municipal boards.

Although the public has, through the medium of the profession and press, been brought to a certain realization of the dangers of infection from tuberculosis, the prevalence of the disease has established such a tolerance to its presence that the most efficient measures, if vigorously enforced, would be offensive and meet with such opposition that they would not accomplish their purpose. Hence, all present measures must be diplomatic in the extreme and unfortunately, must oftentimes be compromises in so far as the more well-to-do classes are concerned. However, it must be borne in mind that after all, the greatest danger to the general public and to themselves, exists among the poorer classes,—those who frequent our public dispensaries and seek the services of the city physician,—but fortunately it is here, where regulation is most needed, that measures can be most vigorously carried out.

The Board of Health of Norfolk, Va., is to be commended for the vigorous action they are taking against tuberculosis. This board has incorporated in its regulations the most salient points, at the same time they have diplomatically avoided arousing the opposition of the upper classes, and the consequent opposition of the attending physicians. It may not be amiss to enumerate the rules adopted by this board.

1. That the Board will register the name, age, sex, color, occupation and address of persons suffering from tuberculosis, and also the name and address of the attending physician and the result of the bacteriological examination of the sputum.

2, That the Board shall disinfect and have renovated the apartment formerly occupied by a tubercular patient, when vacated by death or otherwise, and that no new tenant be allowed to occupy the premises until they have been thoroughly cleansed.

3. That inspectors of the Board be sent to investigate the condition of the premises occupied or formerly occupied by a tubercular patient; that they instruct the patient and his family as to the communicability of the disease; as to the destruction of the sputum, and as to its danger when undestroyed; and that they take such specific measures of disinfection as the case may require. As the Board does not desire to interfere with the private physicians, but rather to aid them, that the inspectors be only sent in the following cases:

(*a*) All cases under treatment at the expense of the city;

(*b*) All cases reported from free dispensaries;

(*c*) All cases whose sputum is examined by the Board free of charge;

(*d*) All cases living in tenements, boarding houses and hotels (i. e., occupying houses jointly with other families), except when their physicians request that no visit be made.

4. That all physicians be urged to report cases of tuberculosis, and that the authorities of all public institutions, such as hospitals, dispensaries, prisons, etc., and the Physicians to the Poor, when acting in their official capacities, shall be *required* to report all cases of tuberculosis coming under their observation within seven days, and that they shall also report their removal from such institution and their future addresses.

5. That the Board will undertake the examination of sputum as an aid to diagnosis. That it will examine free those cases over which the Board can take some sanitary supervision, but that a fee of two dollars ($2.00) shall be charged when the physician requests that no inspector be sent to examine the premises.

6. That the Board urge upon the hospital authorities the importance of the separation of persons suffering from pulmonary tuberculosis from those affected by other diseases, and urge that proper wards be set apart for the treatment of this disease.

7. As the efficacy of this work depends largely on the education of the public, that the Board have circulars of information published and distributed among the people.

(Then follow circular forms to physicians, to landlords and rental agents, and to consumptives)

The circular to physicians explains the object of the regulations and urges the co-operation of all medical men. That to landlords and rental agents explains the necessity of disinfection, etc., at the same time reminds them that their co-operation will aid them in obtaining new tenants. That to the consumptive explains in a simple manner the infectiousness of consumption, how transmitted, care of expectoration and napkins and disinfection of wearing apparel, and finally points out that when all these precautions are observed, there is little danger of communicating the disease to others.

The enforcement of expectoration ordinances, while it undoubtedly lessens one source of danger, also acts as an important educational measure, constantly keeping before the mind the dangers of the sputum of consumptives.

The control of the milk supply by inspection and by the testing of dairy herds with tuberculin, lies not only within the power, but most certainly within the duty of every municipal board of health. In order of importance, we would rank this among the first steps, if not the very first step to be taken in the warfare against tuberculosis, for when we protect the infant, we are protecting every succeeding generation.

THE JOURNAL OF TUBERCULOSIS.

With the present number the second volume of this Journal is completed, and the liberal and cordial suport that has been accorded us from the beginning has become more marked and gratifying during the past year.

The continued improvement and enlargement of the Journal seemed to make it necessary to increase the price of subscription, but upon fuller consideration and with the excellent prospects for a still more rapid increase of the list of subscribers, the publisher feels justified to continue the publication at the old price of one dollar a year.

With the beginning of this year another journal devoted to the subject of tuberculosis has appeared in Germany, and while we sincerely hope that it may prove all that its promoters expect, we likewise regret the discontinuance of the first publication in this special field, the Revue de Tuberculose, which was established in Paris in 1896. We understand, however, that another journal is soon to appear in Paris to take the place of the Revue.

The editor, while offering his appreciation of the cordial support the profession has accorded him, believes that this appreciation will find its best expression in his further efforts to make the Journal still better by improving its appearance and contents as far as that may be within his ability to do; and to this end the January number will have a better cover, the pages will have wider margins and arrangements have been perfected for original contributions from the foremost men in the profession, who have won distinction by their labors in this special field. Articles are now in preparation for the Journal by Professor Brieger of Berlin and by Professor Fluegge of Breslau, while others are being arranged for in this country and abroad to appear in volume number three. The review of current literature will, as heretofore, present in original abstracts and critical discussions what may appear of special merit or importance in other publications.

The supplement of the Journal,which appears to have been a desirable feature to many subscribers, will be continued and probably completed, the next four numbers being devoted to Treatment.

We avail ourselves of this opportunity of inviting American and foreign authors to contribute articles on any subject in connection with tuberculosis, with the assurance of most liberal compensation for original work; and to announce that in the future the editor will be assisted in the conducting of his department by Dr. Wm. L. Dunn, and Dr. S. H. von Ruck, both of Asheville, who have already given him most valuable aid.

SUPPLEMENT TO THE JOURNAL OF TUBERCULOSIS.

In this part the whole subject of Pulmonary Tuberculosis will be covered by a continued series of articles written by Dr. Karl von Ruck to appear in the following order:

Article I.—The Cause of Tuberculosis, and The Conditions Which Predispose to its Acquirement. Article II.—The Prevention of Tuberculosis. Article III.—The Pathology and Symptomatology of Pulmonary Tuberculosis. Article IV.—The Diagnosis of Pulmonary Tuberculosis. Article V.—The Prognosis of Pulmonary Tuberculosis. Article VI.—The Treatment of Tuberculosis, Dietetic, Hygienic and Symptomatic. Article VII —The Climatic Treatment. Article VIII.—The Specific Treatment. Article IX.—Laryngeal Tuberculosis, its Diagnosis and Treatment. Article X.—Institutions for the Treatment of Pulmonary Tuberculosis.

THE PROGNOSIS IN PULMONARY TUBERCULOSIS.

That occasional recoveries in the earlier stages of pulmonary tuberculosis and lasting arrestment of the disease, even in comparatively advanced cases, have occurred at all times in the history of the disease, is no longer questioned under the more modern methods of phthiso-therapeutics, as inaugurated by Dr. Brehmer, based upon hygienic and dietetic principles, actual and lasting cures of phthisis were no longer a matter of chance and accident, or clinical curiosities, at the time when the labors of Professor Koch in 1882 gave a new impetus to the study of pathology, prevention and cure of tubercular disease. The great progress that has since been made has reached a degree, that instead of the former indifferent attitude of the profession at large toward the subject of tuberculosis, the latter has become an object of great interest, and has attracted the best minds in the profession.

The practical results that have followed the discovery of the tubercle bacillus are now manifest in all civilized countries in systematic efforts for its prevention, in the establishment of special institutions for the treatment of afflicted persons, and in efforts for the discovery of more efficient, and, if possible, of specific remedies, decided advances have been made in all these directions.

The fruit of the movement against tuberculosis is also apparent in the clinical results which are being attained at the present time, exceeding by far those that were considered satisfactory and excellent not more than ten years ago.

The prognosis in tubercular disease of the lungs and of other organs has therefore become greatly improved, and while there are still those who assume a skeptical attitude toward the claims of large percentages of recoveries and improvements, which appear in current literature, a growing number of the profession is conscious of the ability to accomplish results, that a few decades ago were hardly thought within the range of future possibilities. While this is true, it must be admitted that many of the reported cures prove illusive, and that much difference exists in the views of observers as to what really constitutes a cure.

I have recently called attention to this subject in an article published in this Journal (1) and have shown the difficulties which arise in actual practice in the classification of the results obtained from treatment; until this question is definitely settled, so that general uniformity prevails in clinical reports, statistics are of little or no value, and I therefore omit them entirely at this time.

The results claimed by different clinical obcervers vary greatly; in the earlier and middle stages of phthisis, they average between 40 and 50 per cent. of apparent recoveries and show a similar per cent. of more or less improvement. The difference depends, no doubt, upon the stage and condition of the patients when they come under treatment, the length of time that they were treated, and also upon the classifications adopted.

There are some physicians who deny altogether the possibility of a cure, claiming that such a result is precluded A PRIORI, inasmuch as restoration of the tubercular tissue to perfectly normal conditions is impossible; therefore, they report no cures at all, although their results are probably equally good as are those of observers, who for a recovery do not demand a return to structural integrity of the diseased tissues.

On the other hand, we find other extremes. Some physicians seem to report as recovered, cases in which under the subsidence of, or even under marked amelioration of symptoms, the general health has been much improved or restored, regardless of the continuance of open and secreting cavities, and regardless of the presence of infiltrated tubercular areas—the fact that there is subsidence of active symptoms and that the patient has regained much or all of his previous weight and strength being deemed sufficient to claim such a result. As almost all cases that are not hopelessly advanced in their disease may reach such a period of amelioration, it can readily be seen that physicians who demand no more, may obtain large percentages of such supposed cures, even in the advanced stages of phthisis.

A general agreement, at least among phthiso-therapists, as to the classification of results, and especially as to what constitutes an apparent recovery, is urgently required, and at some future Congress of Tuberculosis this question should be considered and a standard adopted to which we all may conform.

In my own classification, I have not claimed any positive cures—at the time of discharge of patients or at the discontinuance of professional treatment—but have preferred to affix the word "apparent," inasmuch as the past experience of all observers have shown relapses, renewal of symptoms, and further extension of the disease to be not at all uncommon, even in early cases. For an "apparent cure," my standard as to the local condition of the lungs is, and has been, in the early stages—in which there are as yet no evidences of induration or consolidation—that abnormal auscultatory phenomena have entirely disappeared, the percussion note being normal, and the respiratory mumur vesicular, as we note it in health. Other early stage cases where the disease has existed longer, and has led to more pronounced structural alterations, so that percussion shows more or less dullness, I also accepted as "apparently recovered" when the physical evidence of more recent infiltrations and peripheral extensions had disappeared, when in the dull area there was entire absence of rales or ronchi, with only such evidence remaining as we are accustomed to accept as indicating fibroid changes with cicatrization and retraction. The presence of healed-out, or at any rate dry and shrunken cavities situated in fibroid areas, in still more advanced cases, I do not consider as a bar to the report of "apparent recoveries," so long as the other heretofore stated conditions are present, but in any case, there must be an absence of symptoms, especially of fever, cough or expectoration—or, if a slight amount of bronchial mucus is still raised, it must be free from tubercle bacilli, and must have been so for several months before. The general health must have been restored to a degree that the patient was at least able to follow light occupations or perform a fair amount of physical or mental labor, and he himself had a sense of well being. Whenever such a state has been reached, I believe that, from a clinical standpoint, we can claim that a recovery is apparent.

Arrestment of the disease I claim for cases that have become practically free from fever, in whom the local tissue changes are apparently of a fibroid character; that have no recognizable extension or active processes of any kind, in whom, however, there may be a continuance of a moist cavity, and of cough and expectoration—the latter may contain tubercle bacilli. The general health must have been materially improved, and the symptoms must be limited to only so much of cough as is required to bring up with ease the cavernous or bronchial secretions, and the patient must be conscious of his radical improvement.

Such "apparent" cures I have obtained in almost all early- and middle-stage cases, when the patient was not handicapped by serious complications, and continued under professional supervision for the necessary length of time, and arrestment of the disease or radical improvement I have obtained in over 40 per cent. of advanced cases.

Relapses have, however, occurred, especially in those patients who subjected themselves too soon to adverse influences, by the resumption of business cares or domestic duties, by exposures in unfavorable climates, by return to unhygienic environment and bad habits; these relapses were more frequent before the advent of specific medication than they are now. Under all circumstances, before I accept such cases as ACTUAL recoveries, I deem it necessary that a number of years shall have elapsed, or that the patient shall have been subjected to a full test dose of tuberculin with a negative result.

While apparent recoveries in more advanced cases may also show permanency after a number of years, and a tuberculin test may prove negative, and while in many of my own cases, after ten and more years, this state is still maintained, there is always a greater liability to relapse. The reason for this we find in the fact that in such patients there are liable to be present encapsuled caseous tubercular nodules, and often large masses, and that even after many years these may break down and form cavities when we least expect it. As an instance of such an experience I may mention a patient who at the age of 21 had evidence of phthisis from which he recovered, but structural alterations of the right apex, evidenced by percussion dullness and bronchial respiration, continued and were diagnosed by a number of physicians during the intervening fifty-three years. This patient had no renewal of pulmonary symptoms during all this time and enjoyed otherwise good health until, with an attack of grippe at the age of 74, a cavity formed quickly in the dull area in the right apex, haemorrhages occurred, and caseous and calcareous material was expectorated; tubercle bacilli which took the stain perfectly were found, but the inoculation of guinea pigs showed the sputum to be non-infectious.

Another instance that came recently to my notice, shows how we may err in depending upon recorded statistics of results as they appeared upon the patient's discharge. This particular patient was apparently cured at three different times and eventually died of his disease; one of those cures, the first one, I believe, I had flattered myself as having accomplished; but this patient relapsed several years thereafter and was treated and again discharged as cured, by a very able colleague in California in 1894, and by another in Davos, Switzerland, in 1897; and finally he died in 1899 under the care of a physician in Colorado from whom I accidentally learned of the patient's history subsequent to the time when he left my care. I presume such things happen much more frequently than we now suppose, especially with patients that have reached a stage of cavity formation and of involvement of the opposite lung.

In cases, however, who come under treatment at an earlier period, before the advent of destructive processes, the results appear more enduring,—the more so when the tubercular patient is made to realize that the restoration of his general health and the loss of subjective symptoms are liable to relapse, and if he is cautioned to follow the necessary precautions and circumspection in his subsequent life and conduct; and the like is of course true when arrestment and apparent recovery followed upon more advanced lesions.

The frequent discovery of tubercular lesions in persons who died of other than tubercular disease, although they usually present but small and strictly localized evidence of a tubercular process, cannot be taken as a criterion of the frequency of recoveries: because from what number, will have to be deducted those in whom the process was not actually healed or obsolete, and also those in whom the deposit was recent or latent; in either of which classes active and progressive changes were liable to occur in the future, had the patient lived long enough.

We see, therefore, that the frequency with which actual recoveries have heretofore occurred, and with which they may be noted from our present therapeutic resources, cannot be determined with accuracy, but that relative recoveries in the sense that the patient may lose his symptoms, feel well and be able to follow his vocation for a varying number of years are a matter of daily observation.

If the tuberculin test is eventually more frequently employed to control the results of treatment, and if it is found that non-reacting persons do, as a rule, remain free from recurrences, we can hope to get more accurate statistics in the future than we now have.

That such a test having resulted negatively will, however, in some instances prove misleading, we can already assume to be the case, for we know that well encapsuled, caseous tubercles give no reaction to the test. Such encapsuled caseous tubercles must often be present in supposedly recovered cases, even in an early stage, and, when present, there is no real assurance that softening and excavation will not occur at some time in the future.

All that the tuberculin test can show, by a negative result, is that at the time of the test there was no tubercular process accessible to the circulation which the tuberculin was able to influence; it does not exclude the presence of either a very minute beginning lesion, so small that its reaction could not influence the temperature, or the presence of encapsulated caseous tubercles, that were beyond the reach of the blood or lymph stream, at the time when the test was made. A result, however, which includes the absence of all subjective symptoms, and the absence of local evidence of active or extending disease, and the absence of reaction to a tuberculin test, might well be claimed a real cure, and in the early stages, this can be accomplished in the great majority of cases. Such results are worthy of the most painstaking efforts of physicians and patients alike, and constitute a triumph of modern medicine as great and as gratifying as its progress has demonstrated in any other of its various departments.

The prognosis in general is, therefore, comparatively good in the early stages of the disease, and as regards arrestments and improvements from the more advanced stages under which years of comparatively good or comfortable health may be enjoyed, it is by no means so bad as to justify a hopeless attitude.

So long as the disease is of the chronic form, and is strictly confined to the lungs in patients who are still in fair physical condition, able to digest and assimilate a sufficient quantity of food, efforts for such results will often prove successful, providing that the necessary measures are persistently carried out for a sufficient length of time.

In the prognosis of individual cases, it is not only the stage of the disease that may have been reached that should govern us in estimating the prospect and the probable termination of the case, but many other factors need to be considered and carefully weighed if our estimate is to be such that it will, as a rule, be confirmed in the future.

Under no circumstances will it be wise to be too positive in predict-ing a recovery, or an adverse course, for we know that even after apparent recovery or after the same has been further substantiated by a tubeculin test, a caseous mass that is encapsulated, may break down; the patient is then liable to exhausting suppuration, to haemorrhage and pneumonia, to extension of the disease to other parts, to acute miliary tuberculosis and to the occurrence of a fatal issue. That such liability exists in a greater degree before the apparent recovery has been reached, needs only to be mentioned to be appreciated.

On the other hand, we also know of instances in which extensive pneumonic complications or an otherwise most serious adverse course, such as we witness in acute phthisis, have quite unexpectedly come to a standstill, and the patients have thereafter improved, and were restored to good health; even in cases of acute milary tuberculosis, recoveries have been witnessed by competent observers.

To be correct in the average is, however, all that can be demanded in the prognostication of any disease; at the same time it is sometimes wise to point out that we are not prophets, and that our estimate of the future is based upon what happens as a rule, and not as an exception; and that in making such a forecast we judge the future by our past experience.

At no time should a physician commit himself to a definite statement as to how many days, weeks or months a certain patient will live, though the case may look hopeless in the extreme. I have known of some instances in which the time set for death was not only missed, as is usual, but in which the patients lived years thereafter delighting in talking of the supposed blunder made by very competent medical men, thereby injuring their reputations.

As to the actual stage of the disease, we, of course, can expect the best results in those cases in which the affection is strictly circumscribed and limited to a small area of an apex, and in which softening and excavation have not yet occurred, in which the disease is not progressive and is therefore not attended with well marked subjective symptoms, such as cough, fever, loss of weight, strength, etc.

With the beginning of destructive change, the prognosis must be guarded, the more so the less evidence there is that the disease is limited to a small area, and in cases which show but little or no fibroid changes and limitation of the local disease, the destructive changes are liable to be extensive and to be continued.

More serious yet is the outlook when, in the presence of excavation, and local suppuration on one side, like changes begin to show themselves in the other.

In all such cases, the fever is a good index of the rapidity with which the patient is likely to lose in his general condition, while the extent of the area involved gives us an indication of its probable duration.

If the fever is moderate and does not exceed 101.5° F., if its duration above 100° F. does not exceed more than three or four hours out of the twenty-four, if there are no severe chills or exhausting night-sweats, or if the symptoms are more severe, they yield to rest and general hygienic and dietetic management, and especially if the patient enters this stage with good digestive organs, with a good or fair state of his general nutrition, and with a good circulation, we can reasonably hope to safely pass through this period, and that, although the patient may lose weight and strength, he will thereafter enter upon a period of improvement, which may terminate in arrestment of the disease.

The more advanced the lesions are, and especially the greater the area of lung that is involved, the more does the prognosis become clouded and insecure, but a formed cavity, or several such, if situated in a diseased area not exceeding in extent one upper lobe, need not be a seriously discouraging feature.

A cavity as such may influence the future course of the disease but little or not at all; if it is small and is situated in an upper lobe, is well drained or dry, and especially if it appears to be well enclosed by fibroid tissues, it need never cause any serious trouble or symptoms. It is not so much the formed cavity as it is the period of softening and liquefaction of the caseous mass and the complications that are liable to attend it, which threaten the patient.

Cavities of large size, those situated in the lower lobes, those that are continuing moist and are imperfectly drained, those that show little or no fibroid changes upon their periphery, or are undergoing more or less rapid extension, are of more serious import, and the greater and the more persistent we find the secretion or suppuration in such cavities, the greater is the liability to haemorrhage, aspiration-pneumonia and continued septic absorption.

The presence of associated pathogenic germs in the sputum does not necessarily cloud the prognosis; in many instances they are derived from the mouth and from the upper air passages, when they have no clinical significance at all. When, however, the sputum has been obtained after careful washing of the mouth, by collecting it in sterile vessels, and having washed a globular mass with sterile water, we find it on immediate examination to contain them and in considerable numbers, especially if the slide has been prepared from the centre of such a mass, while not as yet justifying the diagnosis of mixed infection, their presence indicates that they are vegetating in a cavity, or upon a necrotic caseous mass, and that such a patient is more liable to complicating pneumonias, and to prolonged suppuration. The danger from mixed infection is chiefly the occurrence of pneumonic processes, but if they occur, the involved area does not necessarily undergo destructive changes, in many instances complete resolution takes place.

The absorption of toxins from such associated pathogenic bacteria is of course also to be considered, since it may add materially to the existing fever.

Extension of the tubercular process to the larynx clouds the prognosis, the more its recognition has been delayed, and the deeper the infiltrations and ulcerations are that have occurred; of yet more unfavorable import is the advent of intestinal tuberculosis, or of extensive tuberculization of the mesenteric and retroperitoneal glands; and evidence of amyloid disease is, of course, an absolutely hopeless sign.

Few cases of intestinal tuberculosis recover when the disease is once sufficiently established to admit of its certain diagnosis, and the like is true of tubercular disease of the kidneys, bladder and of the internal generative organs, while peritoneal tuberculosis when asssociated with phthisis offers only a slightly better prognosis. In all such extensions we must, of course, take into consideration the extent of the lung affection, and above all, the physical condition of the patient, and the feasibility of surgical aid, in making our estimate as to the probable outcome and duration of a given case.

In making a prognosis in these, as well as in uncomplicated cases, and in any stage of the disease, the general nutrition, and the apparent as well as the inherited resisting power of the individual, are always important, and often more so than the actual extent of the lung disease.

If the physical development is good or fairly good, and the patient is still well nourished, or if in the more advanced disease, with the emaciation that may have occurred, the muscular system has not suffered unduly, and the loss in weight has been chiefly of fat, if the skin is still well nourished, resilient and firm, if the arms and legs are emaciated disproportionately to the rest of the body, if, in women, the mammary glands have not extremely wasted, our prognosis is better than when the reverse is the case, and it becomes the more doubtful the more numerous these unfavorable symptoms are.

Persons who have been weaklings from their childhood or youth, who have, from previous disease or inheritance, a weak constitution, who have never been up to an approximately normal standard, or who have seriously injured themselves by excesses, or alcoholic habits, women who have given birth to numerous children in rapid succession, or in whom the disease has developed actively immediately upon childbirth, have, as a rule, a less favorable prospect for improvement and recovery than do others where such histories are not present. The mere fact, however, that there is a history of phthisis in the family does not diminish the patient's prospect for recovery.

In close relationship to the present physical condition stand the digestive organs, and their integrity is one of the cardinal requisites to a good and unclouded prognosis. Being a disease so constantly attended by wasting, especially when it has made material advances, we are sadly handicapped if the digestive apparatus is such that adequate nutrition cannot be supplied.

Progressive loss of weight is of unfavorable import, but temporary loss, that may occur with circumscribed softening and excavation, or such that may result from errors in diet leading to attacks of indigestion and diarrhoea, while undesirable, does not influence the prognosis if it is readily made up after the disappearance of the cause. Total losses amounting to 25 or more per cent. of the normal weight of the patient are difficult to make up, especially if the loss has been a gradual and progressive one, and when emaciation has reached a still greater degree so that prominent bony protuberances are only covered with a thin layer of skin, there is practically no prospect for recovery.

While gain in weight is always a favorable sign a large amount of adipose tissue is not desirable, and patients that start upon the disease with it, are rather at a disadvantage. During the active febrile periods of the disease, gain in weight is not often observed, and to attempt to force it at such time is often followed by gastro-intestinal complications, with more loss than would have occurred, had no such attempt been made.

If during such periods the loss is but moderate or slight, or if the patient can be sufficiently nourished to hold his own, the prognosis is not worse because no gain is made, or because temporary losses are sustained, and for the estimation of the future in such instances, we must take into consideration the patient's present weight and strength, the probability of the duration of the febrile period, and the probable total loss that is likely to be sustained before we can expect material gain.

Most favorable, from a prognostic standpoint, is a steady gain of weight, when under a fair amount of exercise the muscular system shares in it, when the tissues become firm and the peripheral circulation is good. Such gain is not likely to occur as long as the patient has fever, and it usually indicates an arrestment of progressive tubercular invasion, or of destructive processes. Patients who arrive at such a period and having lost much weight fail in regaining it, or at least a fair amount of it, may have some complications on the part of the digestive or assimilative organs, or their respiratory surface may have been so greatly reduced that the pulmonary circulation is obstructed and diminished, and adequate oxygenation for tissue nutrition is not possible. In instances of the latter cause, the total quantity of blood becomes also reduced, and the vital balance is adjusted to the capacity of the lungs and heart for oxygenation and blood-supply. In other instances, the failure to gain weight, or the cause of progressive loss until a certain balance has been reached, has its explanation in disease of the mesenteric and retroperitoneal glands and lymph channels, interfering with absorption of nutrient material from the intestinal mucous membrane. In a number of such cases observed by me, in which in spite of a good appetite and the ingestion of large quantities of food the patient's weight could not be increased, or showed a steady decline, there were daily two or more large semi-solid stools that appeared of natural color, and the food seemed well digested. In several such instances I had the opportunity to confirm the diagnosis of obstruction in the glands and lymph structures by post-mortem examination; in one case there was tuberculous ulceration with partial stenosis in the thoracic duct. Again the nutrition may remain permanently below par through the occurrence of fatty changes in the liver, which, apart from physical examination of the organ, manifests its deranged function by persistent soft, clay-colored or almost white stools. When such symptoms occur and persist in connection with progressive loss of weight, with good stomach digestion, the prognosis is the more unfavorable, the greater the degree of emaciation that is already present.

Another and equally important condition to a good prognosis is a good circulation and a competent heart. The appearance of tachycardia, in the course of pulmonary tuberculosis, shows, as a rule, that the power of the right ventricle is unequal to the task of overcoming the obstruction in the pulmonary circulation, and unless this condition is recognized and measures are taken for its removal the prognosis is seriously impaired. If such obstruction shows itself by a sharp closure of the pulmonary valves without tachycardia, this behavior of the valves indicates a strong, and probably hypertrophied right ventricle, which is a favorable sign in phthisis. The disappearance of the existing accentuation of the valve sounds, under increased dyspnoea and with a weak and rapid pulse, is indicative of failure of the ventricle to maintain the pulmonary circulation, and may coincide with beginning dilatation. On the contrary, if the existing accentuation disappears, or if it is only noted after severe physical exercise, without due acceleration, with a strong pulse, it shows that the pulmonary circulation is becoming relieved and is well maintained and that the heart is equal to its task.

The severity of the cough, the amount of expectoration, the number of tubercle bacilli contained in the latter, or the admixture of blood with it, and the occurrence of haemorrhage, may in certain instances aid in determining the severity or the degree of activity of the local process, and on that account may have a prognostic import.

Severe cough fatigues and exhausts the patient and often interferes with proper rest and sleep, while it favors the occurrence of pneumonia through aspiration of sputum, especially if the latter is profuse. Large quantities of sputum containing innumerable tubercle bacilli, usually indicates rapid disintegration of caseous material, and persistent admixture of blood with sputum or the occurrence of haemorrhage may be of like import.

Absence of, or but slight cough (except toward the close of life), absence of tubercle bacilli (excepting in miliary tuberculosis, and the beginning of acute, tubercular pneumonia) or their gradual disappearance from the expectoration, absence of other pathogenic bacteria, a slight amount of expectoration, its freedom from blood and the gradual disappearance of purulency are therefore favorable prognostic features.

The occurrence of slight or moderate pulmonary haemorrhage in the very early stage, has as a rule, no influence on prognosis, and apart from the actual loss of blood, haemorrhage in the fibroid form of phthisis is not often of serious import. The danger from haemorrhage lies chiefly in the occurrence of pneumonia, when, with the blood, infectious sputum is aspirated into bronchioles and alveoli. The fact that in the arrested fibroid form of phthisis with open cavities, haemorrhages may be observed which are not followed by evil consequences, or actually give the patient a sense of relief from local congestion, has led some physicians to look upon pulmonary haemorrhages with little concern, or even as having a favorable prognostic significance; but this is not in conformity with the experience of those who have carefully observed their patients and have studied this symptom in the light of existing pathological changes of the individual cases. I have referred to this question at length in the article on pathology and symptomatology, where I have shown that haemorrhages can never be a matter of indifference, even in cases of arrested fibroid phthisis, and that while in such and others no serious harm may result, it is better to prevent, as far as we can, the causes that lead to its occurrence. In many of the patients who suffer from haemorrhage, the latter occurs during the active period of the disease in connection with destructive changes, when the presence of infectious sputum increases the chief danger.

From a prognostic standpoint, I would therefore say first that the haemorrhages which occur in the initial stages and later from non-secreting cavities, rarely endanger the life of the patient either immediately or remotely, but are, as a rule, of temporary disadvantage from the loss of blood and necessary confinement.

Second, that in the course of destructive processes, or proceeding from suppurating cavities, the occurrence of severe haemorrhage has a like disadvantage with the additional danger of thereafter favoring an adverse course, by adding to the exhaustion of the patient at a critical period, or favoring the occurrence of pneumonia, and, in either case, it may change the previous prognosis to a more serious, and in some instances to a hopeless one.

Beyond the favorable or unfavorable conditions heretofore enumerated, there are, however, external conditions which greatly influence and modify the prognosis, and of these we must more particularly consider the patient's character and intelligence, his hygienic and climatic environment and his financial circumstances.

The question of character is a most important one, and its influence upon the course of the disease is much greater than one, at first thought, would suppose. Including morality, will power, determination and self-control—when these are conjoined with intelligence—we have, as a rule, a patient that has not wrecked his life with vice and dissipation, and such a patient will aid us in our efforts for his recovery by conscientious and persistent compliance with our advice in all details and particulars in a manner that will assure the best possible results from therapeutic measures.

While the element of fear and selfishness in morally weak individuals assures a certain amount of proper conduct, at a time when their symptoms alarm them, it always turns out, that with the advent of amelioration or improvement such conduct is no longer followed, and through self-indulgence or recklessness, relapses occur, that might otherwise have been avoided. The way to the consumptive's grave is paved with relapses which as a rule are preventable, and their avoidance depends in a large measure upon the patient himself.

Few patients possess these elements of character to a degree, that their conduct is always faultless, and most of them require the influence of responsibility to their physicians and friends, and of supervision in their daily life and conduct, to keep them steadfast and in co-operation with us, and the more strict and constant such supervision is carried out, the better are we assured against relapse. In estimating the future in our tubercular patients it is therefore necessary that we also know their characters, and when we do not, the prognosis must always be conditional upon an ideal conduct by compliance to the minutest detail with our requirements.

The patients hygienic and climatic environment depend very often upon their station in life and upon their financial resources; when the environment is unfavorable and when by reason of poverty, personal carelessness, ignorance and bad habits, they cannot be materially improved, the prognosis is the more unfavorable in proportion to the existing deficiencies.

Other things being equal, it is of course of great importance that the patient should have sufficient means, by which he may obtain additional hygienic and climatic advantages and professional care beyond those which his home life affords, and which enable him to devote himself entirely and for a sufficient length of time to the restoration of his health. In advanced cases, especially, the prognosis is more seriously influenced and may become well nigh hopeless, even as to the occurrence of lasting improvement, if such advantages are beyond the patient's reach. In the earlier stages, however, when the other factors, inclusive of diet, personal hygiene and character, are on the whole favorable, arrestment of the disease and complete recoveries are by no means excluded, although the patient may not be able to afford expensive sojourns at climatic resorts.

Wealthy patients should always be cautioned that they cannot purchase their recovery by the simple expenditure of money, no matter how lavish that may be, and such as expect to do this, by going the world over from one resort to another, intending to combine the pleasures of travel with their efforts for recovery, according to their own ideas of their requirements, are liable to find in the end that they have chased a rainbow.

The diazo reaction, the presence of which has been claimed to indicate, as a rule, a fatal prognosis in phthisis, has, in my experience, no such hopeless significance, certainly not in cases where in its absence the clinical prognosis would be different. It often is absent in far advanced and practically hopeless stages, and in quite a number of instances in my own practice where it was present and well marked, I have seen it disappear permanently under proper treatment directed to the elimination of waste products through the kidneys. Such cases have thereafter progressed as well as did others in which the reaction had never been observed. In all cases, however, we should make a careful urine analysis, and test for its presence as well as for evidence of kidney disease, etc., before we give our opinion, and when the urine shows the reaction persistently, regardless of the plentiful drinking of hot water or the use of mild diuretics, or when albumen indicates amyloid degeneration, or the presence of albumen with casts indicates other structural changes in the kidney, the prognosis is necessarily bad.

From the foregoing considerations, it appears that we must never be hasty in pronouncing our opinions, and to be as correct as possible, a careful study of the case by a full investigation of all the points which have been mentioned as bearing on the future, is absolutely necessary. That, finally, in any case, the advice and the professional care and skill under which the patient is to accomplish his improvement and restoration may become an equally, if not more, important factor than any other needs only to be mentioned to be appreciated.

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